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Perceptions and Experiences of Older Adults Learning Technology

by

Isobel A. Lawson

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in

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Isobel A Lawson April 15, 1997

11743 - 44 Avenue
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UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Perceptions and Experiences of Older Adults Learning Technology, submitted by Isobel A. Lawson in partial fulfillment of the requirements for the degree of Masters of Education in Adult and Higher Education.

Dr. D. J. Collett

P A Brook
Dr. P. A. Brook

N Keating
Dr. N. Keating

April 11, 1997
Date of approval

DEDICATION

This thesis is dedicated:

To the inspiration of my Grandmother Lillian Lawson. A life-time learner and educator, she began art lessons at 80, golfed till 90, won bridge matches when she was 92, and reveled in the enjoyment of playing the piano. Into her 96th year, she nurtured learning by example, fostered growth through education, and inspired belief in hard and thoughtful work.

To the most influential people in my life: Shirley and Arnold Lawson. I match your unending support and belief in me with my love for you.

Though I do not believe that a plant will spring up
where no seed has been, I have great faith in a seed.
Convince me that you have a seed there, and
I am prepared to expect wonders.

-- Henry David Thoreau

ABSTRACT

The following is an exploration of the perceptions and experiences of older adults learning to use computer technology. The purpose was to better understand older adults' initiative-taking and responses to learning computer technology, and the implications to their future attempts at learning. Two overarching categories--learning predisposition and influences of the learning process--emerged from the data and were used to guide the organization and thematic analysis. From these two categories, six themes emerged. The findings suggest instructors and planners may benefit from developing a learning to learn conceptualization of older adults learning to use computer technology. Further, the findings suggest a typology of older learners based upon the initiative and support required to learn technology. Data was gathered by focus groups and interviews.

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Hole-in-the-wall banking caused hardly a flutter of an eyelid when it appeared, and video recorders are now part of the furniture in many homes. It is not the technology itself that is important but the impact that it has on our lives. Microwave ovens were a clever idea, but their inventor could hardly have realized that their effect would ultimately be to take the preparation of food out of the home and into the, increasingly automated, factory; to make cooking as it used to be into an activity of choice, not of necessity; to alter the habits of our homes, making the dining table outmoded for many, as each member of the family individually heats up his or her own meal as and when they require it.

Whether these developments are for good or for ill must be our choice. Technology in itself is neutral. We can use it to enrich our lives or to let them lose all meaning. What we cannot do is to pretend that nothing has changed and live in a garden of remembrance as if time had stood still. It doesn't and we can't.

Charles Handy, The Age of Unreason (1990, p. 22-23)

If you compare today with school days, yes the way I learn now is much different because I am learning now because it is for me. I knowingly acknowledge that I want to learn and that it is a part of my life, a part of my goals. But I think when I was in school it was just expected that you went to school. It was expected that we learned, but now I am learning things and marveling. You're going to get bored with this, but this creative writing class, now I'm reading like I've never read before. I was a poor speller and a poor reader and now I am reading. I am reading every word, I am reading the structure. My mind is acknowledging how everything is put together and how interesting it is. ...It is different. When you get older or something and you don't have to learn specifically, learning becomes so beautiful. And that's neat.

Barb, 66, a lifelong learner

CHAPTER 1: Introduction

Using technology requires learning; learning requires opportunities. And opportunities to learn technology are not always available. This situation may be especially true for older adults. However, opportunity alone does not account for older adults being least likely to use technology (Brickfield, 1984; Edwards & Engelhardt, 1989). Older adults can and do learn to use computer technology. Applied research, predominately from the last ten years, has integrated findings from basic research on aging to technology, revealing unique learner characteristics which should interest educators.

A dearth of research asks older adults about their relationship with technology. What are their learning experiences with technology? What impact has technology had upon their lives, their independence, their self-esteem, their self concept (Danowski & Sacks, 1980; Geoffroy, 1994)? How does one who is technologically disengaged go about trying to learn? Where does one begin? How do they think about learning technology? One can know how to use computer technology and choose not to use it; without learning, options are reduced. Older adults may find their options reduced because of the perceived and real obstacles before them, perpetrated by a society that has generally ignored older learners (Danowski & Sacks, 1980). There may be nagging stereotypes and self-fulfilling beliefs that their aging mind will not permit learning. There may be a need to protect self-esteem and pride from humiliation, frustration and failure. There may be concerns about the efficacy of technology--where it is leading or pushing society; its social, personal and financial costs; the risk of not learning now and the impact on the future. Learning is integral to this discussion.

Two personal incidents jarred me to wonder about the perceptions and experiences an older adult might have of the unrelenting proliferation and momentum of technology, leading them to respond as "passive recipients" or "active agents" to the personal and social changes (Eilers, 1989, p. 58). In the first situation, I was attending a health-care workshop with 60 or more independent-living older adults when a discussion on mental health turned to the impact of technology. Some participants expressed feeling uncertain, fearful and confused about the meaning and use of technology. How do you learn about it? Does someone, somewhere have information about me? What is the information highway? The dialogue turned to bank machines, the frustration of learning how to use them, feeling embarrassed, worrying about making a mistake, needing money. Digressing, the moderator said, "...and then you have to go and ask some pert little teller to help you." Agreement echoed in the room. Assuming that I was technologically literate, the moderator asked me to explain what the new technology meant; how could people make sense of it? Where would a one-minute explanation begin? It was not the relevance of knowing; it was the fear of not knowing that struck me fast.

The second incident was the exasperation of a well-educated, active older man who found his library had moved to an on-line system that left him, an avid user, behind. He lamented the loss of the card catalogue to the librarian but refused assistance, insisting he could follow instructions as others had. He searched for the enter key as the instructions indicated, without any reason to believe a return key was the answer. He was stymied, went home and did not return. He was shut out by something that was supposed to make his life easier. He did not fail, society did.

Nature of the Study

Where computer technology is considered, older adults typically are not, neither in the development of technology nor in strategies for learning it (Geoffroy, 1994). Yet, North American urban society is engaged with, and smitten by, computer-driven technologies from the sophisticated application to the quotidian.

There is little sense of older adults' perceptions about themselves as learners and users of technology (Geoffroy, 1994; McNeely, 1991). By understanding the learning relationship older adults have with technology, adult educators in roles of service providers, caregivers, community educators and instructors will be better equipped to accommodate and respond to their needs. Such knowledge can assist the development of programs and practices that are sensitive to older adults.

Technology is commonplace. Learning to use it can impact upon older adults' quality of life, including their sense of control and influence over personal and social environments (Czaja, Hammond, Blascovich & Swede, 1993; Danowski & Sacks, 1980; Eilers, 1989; James, 1993). Inclusionary practices that assist older adults to learn technology, and concomitantly assist in using technology as a tool to further learning is a step to lifelong learning; one in which educators have an important role to play.

The findings may be helpful to older adults who think they are alone and feel excluded, misunderstood or underestimated in their attempts to learn technology. These data may have application for industries which have overlooked older adults as consumers of technology (Edwards & Engelhardt, 1989; Geoffroy, 1994; Hoot & Hayslip, 1983).

Rationale

The following is a contextual framework of aging, learning and technology. It suggests an interdisciplinary approach is necessary to better understand the scope of the discussion. The framework is informed of four components: aging of Canada's population; proliferation of computer technology; older adults' ability to use computers; and, implications of technology in older adults' lives. These four parameters establish a context for asking questions about older adults, learning and technology.

Geoffroy (1994) describes the aging of the population and the growth of technology as "two phenomena ...intimately bound together" (p. 4) and largely overlooked in research. Added to this, the study of older adult learning is a third and inseparable phenomena intimately bound to aging and technology.

An Aging Canadian Population

According to the United Nations, Canada became an aged population in 1991 when 11.6% of its population became 65 years old (Desjardin & Dumas, 1993). Recent Statistics Canada figures predict that by 2041, one-quarter of Canada's population will be older than age 65 (Beauchesne, 1995).

By 2016, half of Canada's projected population of 37 million will be older than 40 years, with 16% being older than 65 years. By 2030, the number of Canadians over 65 years is projected to increase to 22.7% of the population (Desjardin & Dumas, 1993). Aging of the population is attributed to declining mortality rates, low fertility rates

(Beauchesne, 1995) and the aging of the Baby Boomers, a post-war generation born between 1945 and 1961 (Northcott, 1992).

For a cohort that largely missed the explosion of computers in the workplace and now finds computers at banks, grocery stores, libraries, and government offices the ensuing situation may be intimidating and frustrating. Rather than enhancing quality of life (James, 1993) technology may be isolating.

The Proliferation of Technology

Rapid growth in technology has changed homes, work and the public environment (Stoll, 1995). Some suggest that technology itself is neutral, how it is adapted it into lives makes it value-laden (Gerver, 1986; Handy, 1990). This perspective is not without argument; however, keeping up with change appears to be a factor in defining value.

A 1994 social trends poll of 1,610 Canadian adults, conducted for Maclean's magazine illustrated the disparity between the ages of those who had skills to use computers and those who did not. For example, 63% of respondents felt that one of the greatest differences between young and old people was youths' understanding of new technologies (Chidley, 1995). Fifty-five percent of those older than 54 years felt that computers made life more complicated (increasing to 58% for those 65 years and older), while younger cohorts' agreement ranged from 33% to 43%. The data suggested that older adults felt they had less control and were at a greater disadvantage than younger people. The difficulty of coping with change may be exacerbated from the marginalizing effect of lack of knowledge, making it increasingly difficult to take advantage of technological changes. Older adults may be in a double jeopardy situation.

Jay (1989) suggested at least four ways that computer knowledge and skills assist older adults: (1) in everyday activities (2) maintaining independence (3) enhancing personal development, and (4) at work. Yet, as research identifies the role technology could have for older adults, manufacturers in their design, application and promotion have for the greatest part overlooked this burgeoning group (Edwards & Engelhardt, 1989; Festervand & Wylde, 1988; Geoffroy, 1994; Hoot & Hayslip, 1983).

Banking is illustrative of how computerized technology has been integrated into daily living. Since automated teller machines arrival in the 1970s, they remain relatively unused by those 50 years and older while, during this time banking has spearheaded a mini-revolution in technological applications (Bohuslawsky, 1993; Clarke, 1995; Gooderham, 1995; Pathak, 1993). By not learning older adults risk losing access to information. Basic forms of technology proliferate in the public at transit kiosks, libraries, airports, retail outlets and government offices (Geoffroy, 1994).

Learning to Use Technology

Older adults have not cottoned to using computers. Commonly accessible and basic technology like video recorders and automated teller machines have a low user rate among older adults (Bohuslawsky, 1993; Brickfield, 1984; Condon, 1994; Czaja & Sharit, 1993; Edwards & Engelhardt, 1989; Geoffroy, 1994; Pathak, 1993). There may be a multitude of reasons, including fear; lack of training; lack of interest, opportunity and information; uncertainty about need, want and ability; and physical and cognitive limitations that make learning and using difficult. Since technology's adaptability and versatility has been its boon and aide to proliferation (Gooderham, 1995), such obstacles are contrary to the ease and efficiency that is to be the mark of "user friendly" technology.

Research--albeit a small body--supports the premise that older adults can and do learn to use technology (Charness et al., 1992; Czaja & Sharit, 1993; Elias, Elias, Robbins & Gage, 1987; Garfein, Schaie & Willis, 1988; Geoffroy, 1994; Jay, 1989; Jay & Willis, 1990). However, as of 1989, only 22% of those 55-64 were able to use a computer compared to 38% of Canadians aged 45-54 (Lowe, 1990).

Older learners are heterogeneous (Battersby, 1985; Courtenay, 1990), resisting simplistic characterization. Increased age, lower education and income typifies those less likely to use technology (Kerschner & Hart, 1984; Seniors Directorate, 1992). Older adult learning needs and conditions can be unique to younger subjects who, typically, have been the focal point of research (Chidley, 1995; Gerver, 1986).

Implications of Technology

Older adults will find it more difficult to independently function in society without knowledge of basic technologies (Bohuslawsky, 1993). According to Garfein et al., (1988): "in relation to older workers/learners, the question is not whether or not they will have to operate microcomputers, but how and when they will learn if they intend to keep their skills current" (p. 131).

While technology is used to compensate for physical limitations, it also has a proactive role to play in older adults' cognitive (Babin, 1988) and psychosocial well-being (Seniors Directorate, 1992). "Just as technology has a major effect in extending the lives of the elderly, it can have a major effect in sustaining independent, fulfilling and dignified lives" (Seniors Directorate, p. 3). Technology can contribute to older adults' independence and quality of life and to their ability to learn (James, 1993). It can enhance self-esteem, reduce feelings of loneliness, strengthen social interaction and communication between family members (Czaja et al., 1993; Danowski & Sacks, 1980; Jay & Willis, 1992), and promote skill development for work and recreation (Morris, 1995). Older adults have also indicated it can have a "dehumanizing effect on society" (Brickfield, 1984). "Older adults recognize the important role technology can play in maintaining their independence and improving their quality of life and they regard as useful any technology that can help them perform tasks more easily" (Geoffroy, 1989). Like any other age group, learning and using technology needs to be meaningful.

Statement of Problem

Data indicate older adults are least likely to be users of technology. They are aware of and concerned with the proliferation of technology and its impact upon their lives. Also, there appears to be a tension between learning: Can I learn? Do I want to learn? How do I learn? Where do I find support? This study assumes that many older adults want to better understand and learn how to use computer technology; they also want to be self-determining in their learning (Knowles, 1978).

The purpose of this research was to better understand, by exploration of perceptions and experiences, older adults' initiative-taking and responses to learning computer technology, and implications to their future attempts at learning, including individually and societally constructed barriers.

Limitations

This research has the following identified limitations:

Focus group and interview methodologies are interpretative processes, as such the researcher attempted to recognize personal bias brought to data collection and analysis. The research process is bound by researcher subjectivity and decision-making. Values and beliefs related to generational, cohort, educational, cultural, social bias may be of special consideration when the researcher is younger than the sample population, as in this study.

Researcher subjectivity is embedded within the interpretation process of coding. The researcher was responsible for identifying and interpreting codes, subthemes and themes from the collected data. Every effort was made to maintain the integrity of participant intent and meaning. All efforts were made to maintain consistency in interpretation, yet remain open to new ideas and ways of perceiving the data.

Attempts to recruit potential participants using a variety of traditional communication methods had limiting success. For recruitment purpose, the researcher spoke with potential participants on an individual basis. Prior to this, the researcher never met any of the participants.

Delimitations

This study has the following identified delimitations:

The participants were female and male residents living in an city with a population greater than 700,000. Access to technology and opportunities to learn in formal settings may not be as readily available in smaller or rural settings.

Though some research suggests perceptional differences may exist in male and female attitudes to technology (Kerschner & Hart, 1984), this research attempted to work from the experiences of the participants with the understanding that though there may be differences due to gender, there will also be overarching experiences consistent to both.

This study is limited to a descriptive account of older adults' perceptions and experiences learning computer technology. Research literature is interwoven with text to suggest bases for the described phenomenon; however, this study focuses upon illuminating what the experiences and perceptions are, not why they occurred.

Definitions

The following definitions are of terms used in the text:

Computer technology: In this study, computer technology is defined according to the following two examples: Geoffroy (1994) and Daamen, van der Lans, Midden (1990).

In a Canadian study of behavior and attitudes of older adults toward technology, Geoffroy (1994) defined communication and information technology as "all technologies supporting remote communication and the manipulation, management or production of information in the form of text, image or sound." The present study confined discussion of technology to information and communication technology as defined here.

Within the literature, technology was defined according to philosophical orientation and use (Misa, 1992). However, in context of this research, computer technology will be considered as information technology defined by Daamen et al., (1990):

> Technology denotes the use of scientific knowledge to produce artificial products from nature. At a slightly more specific level it comprises very different areas such as genetic engineering, automation, information and communication

> technology, medical, military, and energy technology. In the end 'technology' is an aggregation of an enormous variety of concrete applications within each of the areas just mentioned and other ones (p. 203).

Within their study, participants perceived automation (e.g. bank machines), communication (phone technology) and computer (personal computers) technologies to have similar attributes, speaking about them interchangeably as information technology. A similar situation was found to occur in this study in which components of automation, communication and computer technology were referred to as computer technology.

Older adult: For purposes of data collection participants were sought who were "near to 65 years or older"--the age used to collect Old Age Security. This study adopts a view similar to Stokes (1992) that "despite chronological age not being the optimal indicator in all situations or for all individuals" (p. 2) one must make an arbitrary decision of a point in the lifespan to enter into discussion of older adult, recognizing that a chosen chronological age does not mean the group is homogeneous.

The introductory section to the literature review contains a discussion on alternate means of defining older adult including chronological, biological, cohort and lifestage development.

Experience: observation or practice resulting in or tending toward knowledge (Merriam-Webster Dictionary, 1974). In context of this study, experience with computer technology may be actual or have occurred vicariously, with the result of second-hand knowledge impacting upon perceptions and decision-making.

CHAPTER 2: LITERATURE REVIEW

Introduction

The purpose of this literature review was to consider relevant research leading to an understanding of the interaction between older adults, learning, and technology; a study coined "gerontechnology" (Geoffroy, 1994, p.1). The review is organized in two sections, the first being an understanding of the older adult, and the second section focuses upon the older adult as a learner of computer technology. Within these sections are component subsections. The review begins with an overview of perspectives on defining aging.

Defining the Aging Process

The purpose of the following discussion is to illustrate what Stokes (1992) refers to as the "challenge" (p. 2) of defining aging and choosing a definition that is contextually meaningful. The review considers aging as defined from perspectives of function, chronology, biology, cohort, and lifespan development. The challenge is highlighted in the following perspectives:

> The biologist is often concerned with longevity and the antecedents of death, the sociologist tends to focus on social roles and the relationship the aged have with society, while the psychologist is concerned with individual adaptability and adjustment (Stokes, p. 2).

Functional age views individuals according to ability and decrements, whereas chronological age often sets social and legal standards, and reflects cultural rites of passage, such as retirement at 65 years (McPherson, 1991). Functional aging "reflects the relationship between biological maturation or deterioration and how well, if at all, an individual can adapt and perform specific physical, social or cognitive tasks" (McPherson, 1991, p. 31). Defining by functional age requires individual assessment (Atchley, 1988; Welford, 1985) which has limitations: "it is evident that no single, overall index of functional age obtained by combining scores for a variety of performances, can have any useful meaning when applied to individual people and tasks" (Welford, p. 361).

Older adults are heterogeneous by virtue of life experiences and their outcomes, making chronological age "an over simplistic predictor of a person's behavior and functional capacity," further "aging is a continuous process... it is not a uniform process" (Czaja, 1988, p. 586). There is no consensus at what age old age begins. Age is sometimes categorized as young-old being between 60 and 70, and the oldest-old being over 85 (Gutknecht, 1986). Even these categorizations vary (Stokes, 1992). The purpose for establishing age ranges include differentiation of health and economic status, with the oldest typically less healthy and financially less well-off attributable to cohort differences affected by historical factors such as the development of work-related pensions (Stokes). In his study of older learners, Peterson (1983) uses 55-years as a benchmark.

As life expectancy at birth increases, the appropriateness of defining older adults chronologically requires review. For example, the average life expectancy at birth of a Canadian man in 1931 was 60 years (Baker, 1988) and 74.9 in 1994 (Geoffroy, 1994). The life expectancy for women in 1931 was 62.1 years (Baker) and 84.1 years in 1994 (Geoffroy), an increase of 22 years.

Defining according to biological age is "a more sensitive indicator of ageing and residual lifespan" which can account for individual differences among the same chronological group (Stokes, 1992, p. 17). Biological age can estimate an individual's position in relation to potential life span (Schroots & Birren, 1990). Individuals age differently, as do body parts and processes age at different rates (Czaja, 1988; Stokes, 1992).

Lifespan development models suggest a normative process of aging, typically one in which individuals encounter, respond to and pass through life events at different periods in their lives. Because major life events tend to occur in a progressive course across the lifespan how individuals manage those life events will be a factor in successfully progressing to later stages of development. Erik Erikson's developmental stage model is not based upon a chronological age range in the penultimate and ultimate stages of development; in fact, these two stages span a broad fan of years from the late 20s to the oldest of the aged, making broad and tangential assumptions about lifespan development.

Of primary concern for the study of aging in Erikson's model (1964), although each stage impacts upon the next throughout life, is the negotiation through life crisises and tasks in the final two of eight stages in lifespan development. In the penultimate stage, feelings of generativity where one wants to share with others is countered by stagnation, in which one becomes isolated. In the final stage the integrity of a life well-lived and readiness for death is countered by poor resolution of life crisis, resulting in despair of regrets and unfinished businesses. How individuals negotiate the changed focus of social, familial and work-related responsibilities of middle life to later year roles is dependent upon how one mediated events encountered over a life time. The final stage is a response and reflectiveness, accepting or rejecting, in oneself of a life well lived.

Lifespan development perspective places individuals within a context of the history of their lives, shedding light on the unique expectations and patterns of behavior in old age. According to Stokes (1992) understanding old age "requires not just an appreciation of the current life situation, but an understanding of the lifespan as well" (p. 23). Erikson's lifespan development spurred researchers to look at human aging across several dimensions. Coleman and McCulloch (1985) summarize the view:

> Since Erikson formulated his particular theory of human development, we have become more conscious of the fact that the idea of a life-span psychology focusing on psychological variables alone is something of an illusion. All life-span study by definition has to be sociological as well, that is, concerning itself with development and change in people's lives in a given society and over a given time period. Moreover, it is suggested that the rate of change in society has quickened (p. 242.)

Cognition, Intelligence and Memory

Though more recent research would strike down myths that with age comes irrevocable loss in intelligence, memory and learning abilities, some people, including older adults remain captive to these beliefs (Battersby, 1985; Peterson, 1983; Wolf, 1991). Though changes in cognitive processes that can effect memory, intelligence and learning occur with aging (Hultsch, 1974; Light, 1990; Schaie, 1990) intervention strategies can help maintain high levels of functioning. By accepting myths of aging, older adults may avoid learning opportunities (Wolf) and assume self-fulfilling prophecies of victims of learned helplessness (Schaie & Willis, 1991) and cognitive dissonance (Fries & Crapo, 1981). Uninformed educators may not recognize the need to adapt content, presentation, environment and teaching styles to facilitate learning.

Research suggests age-related changes in memory, cognition and intelligence occur in natural disease-free aging (Baltes, 1993; Okun, 1977; Schaie, 1990; Schaie & Willis, 1991; Welford, 1985). The changes, often attributable to a slowing down of the neural structure of the brain and body, can be minimized by coping or compensatory strategies (Baltes) and training (Schaie & Willis). From another perspective: "the parallels among plasticity of memory, intelligence, and physical fitness should be evident. Use of a faculty is associated with improvement of that faculty" (Fries & Crapo, 1981, p.118). Even so, when compared to younger subjects, older adults tend to learn more slowly, to recall less, and experience greater difficulty performing complex tasks (Baltes, 1993; Welford, 1985). According to Schaie & Willis, research tools measuring intelligence and memory of older adults have been found inadequate to address motivation, relevancy and meaningfulness.

Crystallized and fluid intelligence (Schaie & Willis, 1991), similarly called cognitive pragmatics and cognitive mechanics (Baltes, 1993), is one approach to understanding intelligence and cognition. Baltes analogously likens cognitive mechanics to hardware that drives a computer, and concomitantly cognitive pragmatics as the software that individualizes programs. Cognitive mechanics is the neurophysiological makeup of the brain, affecting the speed and accuracy of sensory input, visual and motor memory, and processes of discrimination, comparison and categorization (Klix, 1992 cited in Baltes). Cognitive pragmatics are defined by the knowledge and information that come from a culture, such as reading and writing skills, language comprehension, education, self knowledge and life skills.

Fluid intelligence, or cognitive mechanics, tends to decline with age and crystallized intelligence, or cognitive pragmatics, can increase with age apart from pathological decrements (Baltes, 1993; Schaie & Willis, 1991; Welford, 1985). These categorizations of intelligence are interconnected (Baltes) not binary. For example, older adults with higher levels of education--developed cognitive pragmatics--are better able to retain their intellectual abilities with increasing age (Baltes, 1993; Spence, 1989). Further, crystallized intelligence can more than compensate for loss in fluid intelligence (Atchley, 1988; Baltes, 1993; Welford, 1985). More recently, research has questioned a difference between psychometric and practical intelligence, differentiated from wisdom and expertise and interpreted in one's behavioral conduct in life situations (Schaie, 1990).

Some older adults never experience memory loss and findings show that remote and recent memory can be retained by use (Atchley, 1988; Spence, 1989). From an information processing perspective, older adults often experience a decline in retrieving short-term memory (Welford, 1985). The problem may be in the cognitive pathway that intakes and outputs information, or in locating where the information has been stored, or both. Slowing down of physiological processes has an impact on storage and retrieval, as does the method of information presentation and its relevancy (Moody, 1986; Welford, 1985). The meaningfulness of the method of presentation is demonstrated in memory tests in which older learners perform better at recognition than recall (Okun, 1977; Welford, 1985). Extenuating factors such as health, physical and mental stimulation and community living impact upon maintaining intelligence (Labouvie-Vief, 1990; Schaie, 1990). Learning (Fries & Crapo, 1981; James, 1993; Schaie, 1990) and experience (Welford) can offset the effects of aging. Stimulating environments can positively affect motivation, attention span, concentration and competitiveness (Kennedy, 1992).

The Older Adult as Learner

A Profile

A compendious description of the older learner suggests one who has higher education and income than the age group average, reads a great deal, is gregarious, owns a house, is married, has good perceived health, is socially active and takes early retirement (Peterson, 1983). However, Courtenay (1990) suggests there is no average older learner:

> On one hand, there are older learners with graduate degrees, stable to comfortable incomes, and excellent health. On the other hand, some older students have little or no formal education, only a subsistence-level income, and poor health. In between are older learners with innumerable combinations of characteristics (p. 38).

In sum: "the average older learner does not exist; in reality, there are numerous subgroups of older people with definitive preferences for what and where they wish to learn" (Courtenay, p. 38). Older adults participating in educational programs tend to be highly motivated (Bass, 1986) and self-selecting, for the most part choosing the opportunities they want (Peterson).

Wants, needs, learning style and physical and cognitive abilities are among the factors in learner uniqueness (Courtenay, 1989; Knowles, 1978). Older adults' ability and desire to learn is influenced by lifestyle, life transitions (Kennedy, 1992), health, amount and success of previous education, years since attaining education and historical events that influenced their life course (Bolton, 1990). Older adults are greatly affected by the lack of opportunities and resources allocated to them (Battersby, 1985; Sihvola, 1985).

Determining older adults' participation in learning activities is tentative at best. MacLeod (1985) reported that in 1983, Canadians 65 years and older accounted for approximately 4% of the enrolment in formal classes and training. The figures would be higher if informal, nonformal (Courtenay, 1990) and full-time programs were included (MacLeod). Less readily identifiable are those involved in self-directed learning (Cavanah & Williams, 1994; Courtenay, 1989).

Participation in adult education is cohort related and prior attainment of education influences continuing education in later life (Schaie & Willis, 1991). Women are more likely to participate in educational activities than men due, in part, to longevity (McLeod, 1985). Today's aged have less education and income than more youthful generations but more than their forebears. This disparity is expected to decrease with the aging of the Baby Boom generation (Baker, 1988). The consequence of women living longer and alone requires "a new attitude towards independence and aging" including "a more assertive approach" to skill development (Baker, p. 60). Continued learning can help older adults stay informed, cope with life changes and maintain independence (Baker, 1988; Bolton, 1990; Courtenay, 1990; Moody, 1986; Peterson, 1983).

Fear of displaying ignorance; belief that with physical decline comes mental decline (Cavanah & Williams, 1994); performance anxiety resulting from painful or humiliating memories of childhood school days are pieces of baggage that older adults can bring to learning situations, or worse, keep them from exploring new opportunities for learning. In a study of older adults' attitudes to participating in learning activities, Cavanah and Williams found respondents were "overwhelmed by changes that took place faster than the rate with which the individual could keep pace" (p. 81). Supported by research that says older adults learn at a slower pace, this finding illustrated the need for older adults to feel in control of their learning. Self-esteem can be fostered in learning activities; however, frequent supportive acknowledgments and immediate feedback are critical to developing a sense of security and confidence (Carter & Honeywell, 1991; Cavanah & Williams; Kennedy, 1992; Peterson, 1983; Wolf, 1991).

Researchers write of learning to learn as a life-long pursuit, an on-going process that does not reach attainment (Candy, 1990; Smith, 1990). Conceptually learning to learn "implies not only that individuals gain certain skills but also that they develop attitudes or proclivities toward learning, and toward their own capacities to learn" (Gooler, 1990, p. 321). Yet, for older adults the proliferation of technology may be as a crook in the road that requires rethinking and redirection, heightening "the need and motivation to learn" (p. 321). Gooler adds, "individuals may need to engage in a lifetime of learning not as a matter of choice but as a matter of survival" (p. 321). As apocalyptic as this sounds, Gooler identifies the paradox that maintaining independence in a society that has become increasingly interdependent requires continuous learning.

Theoretical Underpinning

Some educators of older adults suggest that principles of adult learning, in particular andragogy, are applicable to older learners (Davenport, 1986; Peterson, 1983; Thorson & Waskel, 1991). The principles emphasize the mutual relationship between learner and teacher, emphasizing the self-directedness of the learner to enter into and make decisions about his/her learning (Knowles, 1978). Others, like Lebel (1978) and Battersby (1985) question whether andragogy adequately addresses the uniqueness of older learners.

According to Peterson (1983) andragogical principles assume that older learners are self-directed, they draw upon personal experience, their choice of content and skill is defined by their stage of development; and that they are problem-centred in their learning. Peterson adds that older learners are motivated by personal needs, which raises questions about the uniqueness of older adult needs, and how needs are fulfilled (Courtney, 1989).

Lebel (1978) asserts that andragogy does not account for the unique psychosocial changes that occur with age. As a result, andragogy is based more upon chronology than stage development. Geragogy or the art and science of teaching older adults (Lebel, 1978) has been proposed as an alternate concept to andragogy (Battersby, 1985; Hartford, 1990; John, 1988; Schuetz, 1981; Yeo, 1982). From a geragogical perspective, Lebel suggests that older learners have a dependent self-concept, they are unable to use their accumulated experience because they are isolated from stimuli, their development occurs apart from social settings, they display a tendency for subject-centred content, and application of information is secondary to the primacy of the learning experience.

Geragogy, as Lebel (1978) describes, does not reflect all older learners, just as andragogy does not account for all adult learners; however, Lebel addresses issues which require greater study including whether attributed changes are developmental or cohort related. As an illustration Welford (1985) yellow-flags the need to identify the difference between developmental and cohort changes:

> The question is how to ensure that those of different ages are comparable in ways other than age... even if subjects are fully equated for such variables as social, occupational, and economic status, the problems remain that, over the years, factors such as standards of living, medical care, and nutrition have risen. These can have lasting effects, and it may be that differences between people of different ages do not reflect the effects of age, but of the conditions under which they were brought up, so that performance will vary with the 'cohort' into which the subjects were born (p. 361).

Welford illustrates how universally defined attributes of older learners, such as suggested by Peterson and Lebel, must be cautiously mediated at the risk of misinterpreting age for time-specific experiences of a cohort. Over time such attributes may not be sustainable. Geragogy as Lebel describes, may narrowly characterize older learners who are isolated or institutionalized.

Conceptualization and formalization of a theory of gerogogy are not forthcoming (Lebel, 1978; Yeo, 1982). For the greatest part, theoretical frameworks of the older learner are wanting. Rather the direction is toward identifying attributes of the older learner and applying appropriate instructional techniques. In sum, conflation of learning theory with instructional design is still largely untested (Bolton, 1990; Davenport, 1986).

The Older Adult Learner and Technology

Computerized technology is ubiquitous. Regardless of age, those who do not learn how to use technology--whether by choice or lack of opportunity--will be at a disadvantage, unable to access information and services that were once readily available (Condon, 1994; Waneless, 1994). Older adults risk becoming "informational have nots" (p. 57) living apart from a growing computer literate populace (Eilers, 1989). They may be restricted by limited learning opportunities, inaccessibility to computers (Eilers) and hampered by personal and societal notions that computers are the domain of youth (Eilers, 1989; Manheimer, Snodgrass & Moskow-McKenzie, 1995).

As the level of education increases with succeeding generations (Baker, 1988) so should adaptation to, and knowledge of, technology as it is integrated into home, education and work environs (Garfein et al., 1988; Manheimer et al., 1995; Morris, 1994). Preceding cohorts have adapted to rapid changes in technology, such as television, telephones, airplanes, microwaves and medicine (Brickfield, 1984; Manheimer et al., 1995; Seniors Directorate, 1990) yet, the rate of change may be rapidly outpacing learning (Waneless, 1994). Though not a problem rooted exclusively in age, older adults whose social circles tend to become smaller (Festervand & Wylde; 1988; Sherman, 1984) and who have little or no personal contact with computers may be particularly vulnerable (Ansley & Erber, 1988; Czaja, 1988). Those older adults who have developed technology skills may have more options (Eilers, 1989; Hicks & Jaycox, 1976; Thompson, 1992).

Older learners remain virtually ignored when compared to research on youth and computers (Ansley & Erber, 1988; McNeely, 1991). As a group, older adults are least likely to use technological gadgets including, automated teller machines and computers (Bohuslawsky, 1993; Brickfield, 1984; Condon, 1994; Czaja & Sharit, 1993; Pathak, 1993). Though still at a formative stage, research has focused upon older adults learning to use computer software packages, including word processing (Charness et al., 1992; Czaja et al., 1989; Elias et al., 1987; Hartley et al., 1984; Morris, 1994), desktop publishing (Jay, 1989; Jay & Willis, 1992), and spread sheet (Czaja & Sharit, 1993; Garfein et al., 1988). The studies vary in focus from prevailing attitudes, attitudinal changes, effects of anxiety, age comparative research exploring differences in process and outcome, and method of instruction.

Attitude to Computer Technology

Contrary to stereotypes of older adults being unwilling to change, research suggests they are neither fettered by negative attitudes of technology (Ansley & Erber, 1988; Charness et al., 1992) nor *technophobic* (Edwards & Engelhardt, 1989; Manheimer et al., 1995). Further they are willing and enthusiastic about learning to use computers (McNeely, 1991). Older adults that volunteer to participate in computer studies may have a more positive attitude toward technology.

Attitudes of computers appear to become more positive with hands-on experience (Ansley & Erber, 1988; Kerschner & Hart, 1984; Danowski & Sacks, 1980; Jay, 1989; Morris, 1994), leading Jay & Willis (1992) to suggest the change is an example of the "plasticity of older adults' attitudes" (p. 256). Of seven measured variables, Jay & Willis found that comfort and computer efficacy (i.e., competence with the computer) had the greatest amount of change. The researchers sought to change selected attitudes by making the learning experience positive and assuring learner success, suggesting that to change other attitudes training must focus upon specific attitudinal dimensions. From research on computer-mediated communications, Danowski & Sacks (1980) found in a post-test that participants held more positive attitudes of computers generally, and believed that computers were useful.

In a study of instructional influence on attitude change, Morris (1994) found older adult participants acquired greater confidence from knowledge of the language; more positive feelings about computer applications and uses in society; and felt less apprehension and social alienation. Czaja et al. (1989) found no attitude difference between young and old subjects prior to a training study using a text-editor. However, following training, those who performed poorly and rated the training session and text editor negatively were predominantly older learners who were working at a slower rate with higher errors, suggesting training is closely tied to achieved attitude. Zandri & Charness (1989) had similar attitudinal findings.

Researchers suggest attitude studies should be reviewed with care because measurement of attitudes and their change tend to lack consistency. Studies generally have nonrandom samples, attitude scales are not proven valid or reliable, and testing for attitude emerges as a byproduct of the study (Czaja, 1988; Jay & Willis, 1992; Zandri & Charness, 1989). However, Kelley & Charness (1995) suggest that since attitudes are likely to become more positive as computers become the norm, research on mediating computer anxiety through positive coping strategies is more relevant research. Anxiety may decrease as computer use expands, but it will not be eliminated.

Age, Education and Computer Use

Kerschner & Hart (1984) found that older adults with higher income and education, and a positive attitude toward technology were most likely of those in their age group to use technology. Brickfield (1984) found the higher the level of education the greater was the use of a variety of technologies. Two studies found that education was not an influence in computer attitude or computer proficiency; however the training period in the former study was of a very short duration (Ansley & Erber, 1988), and in the latter, the levels of education were too similar to be comparative (Garfein et al., 1988). Level of education does not appear to be widely studied though this information is often collected and recorded from samples. For example, in the following studies (Czaja et al., 1993; Czaja & Sharit, 1993; Elias et al., 1987; McNeely, 1991; Morris, 1994; Zandri & Charness, 1989) data on educational level was collected but not used in analysis.

Prior computer experience and age were predictors of performance in a multi-task computer research (Czaja & Sharit, 1993). Increased age was associated with less computer experience, longer response time and greater number of errors. However, prior experience accounted for the greatest difference in response time and errors. Gist, Rosen & Schwoerer (1988) found that even after allowing for previous computer experience, age was a stronger predictor of performance. Clarifying what constituted previous computer experience (Garfein et al., 1988), even whether younger and older subjects defined prior experience similarly (Gist et al.) was problematic. Though age will continue to be a predictor of ability, Kelley & Charness (1995) suggest that because many older adults are now gaining exposure, future research should focus on training methods to enhance prior knowledge and less upon testing capability for skill development.

Though computer training programs for older adults are becoming more popular, (Crawford, 1996; Ramstad, 1994; Zdeb-Montgomery, 1993), intervention programming is still novel. And while research strongly supports older adults' ability to learn computer technology, opportunities to acquire skills may be older adults' worst enemy (Czaja et al., 1993; Edwards & Engelhardt, 1989). Prior to developing computer programs: "It is important to understand how the elderly feel about technology and to determine if there is a desire to learn about computers at all" (James, 1993, p. 204).

Learner Characteristics

Several characteristics predominate the literature: older adults can and do learn; they require more time to complete tasks, and they require a greater amount of trainer assistance. Requiring more time than younger learners to complete tasks is generally attributed to a complex interaction of the type of task and the natural decline in cognitive, motor and sensory abilities (Czaja & Sharit, 1993; Charness et al., 1992; Charness & Bosman, 1990; Elias et al., 1987; Hartley et al., 1984; Jay, 1989; Sterns, 1986). "Computers stress the perceptual, cognitive and motor capabilities of their users" (Charness & Bosman, p. 458).

Learning computers may be affected by the amount and type of visual decline older adults experience, considering technology's reliance upon visual modality. Schaie and Willis (1991) cite five age-related visual changes, including: slowing down of visual processing; decreased light sensitivity; reduced ability to follow moving objects; near vision; and difficulty locating objects in visually complex environments. These changes may be magnified by computer technology that adopts more youthful sensory as the design standard. The outcome of research investigating age-related visual changes using computers to include: difficulty picking out details on scrolling screens, slower reading speed, need for greater amounts of illumination at the risk of glare, sensitivity to low contrast and declining colour discrimination. (See Charness & Bosman, 1990; Czaja, 1988 and Thompson, 1992 for greater detail.) For example use of bifocals--commonly used as a coping strategy for presbyopia--can result in neck and eye strain from referring between document and screen.

When compared with youth, older learners required more trainer intervention (Charness et al., 1992; Charness & Bosman, 1992; Elias et al 1987; McNeely, 1991; Zandri & Charness, 1989) especially in the early stages of learning (Hartley et al., 1984). Zandri & Charness suggest that older learners were less effective at problem-solving but could learn as effectively if given twice the time of younger learners; a consideration important to program design (Charness et al., 1992; Elias et al., 1987). Further, Elias et al., found intervention was, on many occasions, trainer initiated after the learner persisted in using incorrect commands, procedures or simply did not understand the material. Because older learners asked for assistance at about the same rate as younger learners, Elias et al., suggested learners need to take initiative for their learning. This may be symptomatic of feeling out of control and not wanting to admit ignorance.

Though Hartley et al. (1984) found that after 12 hours of word-processing training older and younger learners had the same information recall, Elias et al. (1987) produced contrary evidence. However, the information recall difficulties Elias et al. attribute to older learners are suggestive of spatial memory demands which decline with age (Czaja, 1988; Kelley & Charness, 1995). For example, older adults were found to have difficulty with broad cursor movement, text shifting from the screen (Elias et al.), and text formatting (Czaja et al., 1989) similar to what Czaja (1988) reported in a comprehensive amalgam of literature on spatial memory decline. And while computer function commands may not confound spatially as the layering effect of menu commands, because function commands are nonsensical they rely upon short-term memory (Kelley & Charness).

Older adults had difficulty attending to subtle changes in task information (Czaja & Sharit, 1993), consistent with studies that suggest processing multiple and increasingly complex tasks slows with age (Baltes, 1995; Welford, 1985). As a strategy to reduce the number of errors, participants attempted to slow the pace and in the process became increasingly anxious about external constraints (Czaja, 1988). Removing time restrictions eased attention and memory demands, and reduced exhaustion and anxiety (Czaja & Sharit, 1993; Hoot & Hayslip, 1983). Czaja & Sharit found older adults experienced higher levels of fatigue and produced increased number of errors as they were learning to use progressively more complex computer programs.

> More effective interface designs and training may help to make tasks less difficult and less fatiguing, which may in turn lessen the anxiety of older people when initially encountering this type of technology (p.66).

More research is needed to determine how computer interface affects users (Edwards & Engelhardt, 1989). For example, menu configurations can be designed to decrease information held in working memory (Czaja & Sharit, 1993), that tax short-term memory (Baltes, 1993; Light, 1990; Welford, 1984). Modifications to screen displays, letters, numbers and symbols by magnifying images and increasing contrast; colour-coding and texturizing keys can assist memory recall and ease visual strain (Hoot &

Hayslip, 1983). Research on screen characteristics, size, colour and text types has "almost all ... been carried out using young adults" (Charness & Bosman, 1992).

Technology has not been designed with aging users in mind, consequently youth are the standard and older adults are measured from them. More research is needed that illuminates the interaction of cognitive, motor and sensory decrements with the computer interface, process of instruction, and socioenvironmental conditions. According to Kelley & Charness (1995) while older adults have greater difficulty learning computers, the reasons why are not well understood. "Unfortunately very little research has been conducted specifically to determine which cognitive changes are important mediating variables in the age related reduction in ability to learn to use a computer" (p. 108).

Computer training

Researchers point to the dearth of studies with older adults affirming one training technique more effective than another (Charness et al., 1992; Gist et al., 1988); going so far as to question whether age is influenced by training method (Charness et al.). Charness & Bosman (1990) suggested the benefits of one training method over others is still a "critical though generally unresolved issue" (p.534).

From a study using three training methods: on-line, manual, and instructor Czaja et al. (1989) found on-line training least effective across all age groups. This was contrary to McNeely (1991) who found that computer-assisted instruction was an effective teaching strategy for its self-pacing, organization, immediate reinforcement, and ability to repeat actions--features cited for general instruction of older adults (Okun, 1977). Czaja et al. found those learning from computer-based instruction performed fewer tasks, took longer to perform and made more errors. On-line instruction was found to be passive, lacked opportunity to practice knowledge transfer from practice to real situations, and had too much detail without opportunity for skill mastery; contrary to research that older adults require greater hands-on activity (Carter & Honeywell, 1991).

Gist et al. (1988) found in an age comparison of individuals learning to use computers that behavioral modeling was superior to video tutorials for older adults. Contrary to findings that older adults prefer and perform better with self-pacing (Bolton, 1990; Peterson, 1983) Charness et al. (1992) found little difference in performance, anxiety, speed or attitude between younger and older participants in self-pacing. The quality of the training session would be a determinant of performance. According to Owens (1988) while "attentive instructional practices" can remediate age-related decrements "our ability to detect and compensate for age-related differences in habits, skills and intellectual operations is not so effective" (p. 23).

Summary

The preceding was an overview of research on the older learner. The purpose was to present a representative summary of current thoughts, findings and the direction of research, and to provide a broader view of the relationship between technology, the older adult and learning in a changing social clime.

As cognitive and sensory changes occur with aging so do factors related to learning. Though motor skills were not discussed, they too impact upon learning to use technology, such as the clicking and moving of a computer mouse. The literature illustrates that educators are becoming increasingly interested in older learners but, as yet, there is no strong theoretical grounding and research is piecemeal.

Research on older adults, learning and technology may be viewed as a progression. Researchers initially questioned older adults' attitude and whether they had the ability to learn technology; today that knowledge is well established. As research continued to mature, questioning focused upon older adults' learning performance in comparison of youth. If the trend continues research on the next wave of older adults, who presumably will have greater exposure to technology, will focus on adapting prior technical knowledge to new situations, and reducing anxiety (Kelley & Charness, 1995).

The number of problems older adults need to reckon with in using technology suggests how ill-designed computers are for older learners. Taking what is known from basic research, for example: decline in spatial memory, sensory and motor loss and changes, slowing down of cognitive processing, the review of literature illustrated that computers show scant essence of user friendliness to older learners; and it is not because they cannot be designed that way, but they are not.

The dearth of research supports Czaja & Sharit's (1993) view that more studies are needed over a broad range of issues. Danowski & Sacks (1980) and Geoffroy (1994) suggest that more questions need to ask the effect computers have on older adults' self-esteem and beliefs, and what facilitates and inhibits learning. Danowski & Sacks continue:

> If evidence is obtained early in the developmental stages of computer communication systems, it is more likely that they can be designed and constructed to meet the needs of the elderly. Otherwise we may be eventually faced with attempting to `retrofit' older persons to the technology. This may not be the most efficient, let alone humanistic, way to proceed (p. 128).

Danowski & Sacks' 15-year-old comments remains to haunt. Manheimer et al. (1995), supported by Bowe (1988), suggested that industry does not assume culpability for older adults inactivity with technology:

> criticism of telecommunications and technology industries for being unresponsive to the interest of older learners is unwarranted, since older learners prefer using what other age groups are using (p. 170).

The premise is provocative if not insensitive to the emerging research. Research has identified limitations of some technology but the need for product designers to include older adults on test panels is still apparent with the corollary that if older adults were the standard then computer technology would likely be inclusive to all (Charness et al., 1992; Charness & Bosman, 1990; Czaja, 1988; Edwards & Engelhardt, 1989; Geoffroy, 1994; Hoot & Hayslip, 1983).

CHAPTER 3: RESEARCH METHODOLOGY

Introduction

The purpose of this study was to develop a better understanding of older adults learning computer technology and the implications to future attempts at learning, through the collection of their perceptions and experiences. As the literature review suggests, the experience of aging is replete with social, cognitive and physical changes that impact upon learning. For many older adults, learning to use technology--a process that has primarily focused upon youth (Morris, 1994)--may be a new way of thinking about oneself, and about one's learning. An understanding of older adults' perceptions and experiences of technology generally and as they relate to learning can be useful to developing deeper and broader knowledge of the older adult as learner.

Chapter 3 is an explication of the methodology used in this research, commencing with a discussion of the theoretical orientation that drives the methodology--from both a qualitative and a gerontological perspective--followed by the research design. For clarity of research purpose and data analysis it is necessary to identify the theoretical basis of one's research and methodology (Bogdan & Biklen, 1992; Crabtree, 1993).

Theoretical Orientation

This section establishes the theoretical orientation of the research. According to Bogdan & Biklen (1992) a theoretical orientation, or perspective, informs the assumptions one makes about what is important, and the way one looks at the world and how it works.

This study was rooted in the deep questioning, interactive and interpretative nature of grounded theory (Strauss & Corbin, 1990), seeking the point of view (Bogdan & Biklen, 1992; Luborsky & Rubinstein, 1995) of older adults, believing they possess valuable and unique knowledge about the social world they experience. Phenomenological studies focus "on descriptions of what people experience and how it is that they experience what they experience" (Patton, 1990). The task was to discover the meaning people made of their experiences and perceptions--through systematic collection, analysis and interpretation of data--and how the constructed meaning shaped people's reality, influencing their actions and values.

Grounded theory methodology is an active process of discovering meaning using a systematic process of reasoning and interpreting the make-up of phenomenon and combining this process with theoretical concepts that give meaning to one's world (Strauss & Corbin, 1990). Further:

> The purpose of grounded theory methodology is to develop theory and not to merely describe phenomenon. And, in order for it to be theory, concepts must be systematically related, because it is *not* enough simply to say certain conditions exist and then to require readers to figure out what the relationships to that phenomenon might be (p. 167).

Research and Older Adults

Some researchers have questioned the almost-exclusive use of positivistic methodologies, predominant in biomedical and psychological sciences, to study older adults. Research of the aged has traditionally been dominated by "standardized measures, survey-style samples and statistically based data analysis" that focused upon the pathology of aging (Luborsky & Rubinstein, 1995; Rubinstein, 1994). The contention is that positivistic methodologies view the older adult as objects of research (Gubrium, 1995; Luborksy & Rubinstein, 1995; Murphy & Longino, 1992; Rubinstein, 1994; Thorngate, 1993). Only more recently has descriptive research, using personal accounts been used as data sources (Murphy & Longino, 1992).

> Key to the theoretical shift attendant to qualitative research is the idea that every aspect of social life is embedded in symbolism. Therefore, those who do research in ageing should be sensitive to the ways in which persons interpret their lives, instead of simply focusing on empirical indicators. Only in this way can socially relevant research be conducted (p.143).

Further, the older adult's subjective voice is bound to the social context of the described experiences, placing the subjective voice in "dynamic tension" with social norms (Gubrium, 1995). Qualitative research captures subjective responses and illuminates a broad view of the social and cultural world that define and shape how individuals create meaning and take action (Luborsky & Rubinstein, 1995). In this context, the meaning older adults make of technology, its effect on their personal and social lives, and their actions can be understood, in part, from their perceptions and experiences.

Qualitative approaches to studying older adults are still not readily accepted (Rubinstein, 1994). It is still necessary to defend the use of qualitative approaches to studying older adults because there is neither an ""overly optimistic assessment" (p.76) nor a belief in its practical application. Rubinstein cites three purposes for qualitative methodology: to explore niches not studied using quantitative methods; to use prior to psychometric or survey procedures; and to use when studying process and meaning.

Further, Keith (1994) suggested four areas in which qualitative methods excel: when there is a limited amount of previous research; when there is an emphasis on meaning and perspective; when there is a need for a heuristic understanding of the social setting; and, when quantitative strategies are inappropriate. Focus groups and interviews were conducted in the following research, employing a qualitative research strategy in an area of study that contained a limited amount of research.

Data gathering from older adults may require additional consideration, allowing for the complex make-up of this heterogeneous population. For example, Boshier & Riddell (1978) found older adults reluctant to complete even short questionnaires. Radcliffe (1991) found older adults often responded to a preferment-graded survey questionnaire with a dichotomous yes or no. As well, many of that study's respondents wanted to be asked survey questions aloud rather than answer the questions on their own. Geoffroy (1994) found the technical nature of computer language made it difficult for older adults to understand and respond to questions.

Older adults who feel marginalized from computer technology may be more comfortable discussing, exchanging and re-evaluating their views when they believe that others understand. That is, they know they are not alone with their problems. For example, Geoffroy (1994) found older adults did not have the computer vocabulary to describe computer experiences; a problem not uncommon to the population generally (Gerver, 1986). In Geoffroy's study, the sample had difficulty "expressing their technological needs and interests and in assessing equipment or services they haven't had the opportunity to use" (p. 16).

Other considerations with older adult samples include mobility, which effects the choice of location for data collection (Romaniuk, 1981) and fatigue from over-extended data-gathering sessions (Quine & Cameron, 1995). Recording shortcomings is critical to developing future methodologies. Assumptions that older adults do not understand or appear disinterested in research may be a result of poor methodology and communication and not a reflection of the sample population's abilities or interest.

Research Design

Research methods are selected for their utility to achieve research goals, answer research questions and for their contextual suitedness (Strauss & Corbin, 1990; Crabtree et al., 1993). Focus group inquiry is suited to gathering breadth and richness of detail (Carey & Smith, 1994; Crabtree et al., 1993) from the exchange, interaction and reasoning of participant ideas, perceptions, opinions and experiences (Carey & Smith, 1994; Frey & Fontana, 1993; Morgan, 1988; Morgan & Krueger, 1993). The interaction of older adults within a focus group may be particularly suited for stimulating memories, provoking thoughts and expressing cohort-related experiences. Though research using focus groups with older adults is infrequently reported, Quine & Cameron (1995) found them to be an effective method with disabled older adults. They suggested some modifications including assuring physical comfort and ease of hearing, using group sizes of 5 or 6 participants with disabled elders and slightly more for nondisabled, shortened group sessions, and a moderator attentive to nonverbal cues. Morgan & Krueger suggested that focus group exploration, when conducted in a safe environment that is open to inquiry is well-suited to populations which have limited power and influence.

Focus groups can be a potent tool for drawing out, developing and integrating participants' ideas and insights (Morgan, 1988; Stewart et al., 1990). "Focus groups are useful when it comes to investigating *what* participants think, but they excel at uncovering *why* participants think as they do" (Morgan, 1988, p. 25). The strength of focus groups is in their ability to bring out cognition and attitude through the expression of perceptions and experiences (Morgan, 1988).

Participant Sample

The participants were recruited by purposive selection (Patton, 1990; Strauss & Corbin, 1990), a method in which "subjects are intentionally selected to represent some explicit predefined traits or conditions" (Luborksy & Rubinstein, 1995, p. 104). There were 27 participants total and an attempt was made by the researcher to select participants who possessed knowledge, understanding or beliefs of the social phenomenon (Luborksy & Rubinstein, 1995). This method is consistent with focus group sample selection (Fuller et al., 1993; Knodel, 1993; Krueger, 1994) and qualitative studies generally (Bogdan & Biklen, 1992; Strauss & Corbin, 1990).

Focus groups have a minimum of four and a maximum of 12 individuals (Albrecht et al., 1993; Krueger, 1994; Morgan, 1988; Stewart et al., 1990); too few respondents and the exchange may stagnate, too many and depth of discussion is compromised. The number of focus groups is flexible however, Crabtree et al. (1993) suggest that 4 to 6 groups is typical. An attempt was made to recruit participants who:

- were approximately 65-years or older;
- were living within the community at large;
- were self-described as physically and mentally healthy;
- had exposure to computer technology and had an interest in learning to use computer technology. The interest could have been a result of negative or positive experiences and perceptions.

An attempt was made to identify participants for common interest in the topic, homogeneous social status, education, age and gender (Knodel, 1993; Krueger, 1994). A focus group sample is purposively selected for homogeneity of specific characteristics to create a nonthreatening environment (Knodel, 1993). Maintaining homogeneity of computer ability was important to this research. For example, in one focus group, one participant of 11 was computer literate and he spoke only briefly in the group, yet he spoke openly one-on-one. Peer influence may have been a factor.

Fieldwork can be terminated when theoretical saturation is achieved (Knodel, 1993; Morgan, 1988), that is when no new evidence is forthcoming from the focus groups; the categories are dense in data; or relationships between categories are well established and validated (Strauss & Corbin, 1990). Flexibility in data collection is consistent with developing grounded theory, providing latitude to re-examine collected data and allowing expansion of underdeveloped concepts (Luborsky & Rubinstein, 1995; Strauss & Corbin, 1990). With the interviews corroborating and expanding upon the focus group data it was felt that saturation was achieved.

Data Collection

Data were collected from two primary sources: three focus groups and three interviews. Secondary resources including notes of observations and insights written during and after data collection, transcription and analysis (Bogdan & Biklen, 1992; Strauss & Corbin, 1990). The focus groups had 11, 6 and 5 participants each. Two interviews had two participants each and one interview was conducted one-to-one. The interviewees were recruited separately from the focus group participants. The researcher conducted all the interviews and organized and moderated all focus groups. The focus groups and interviews elicited rich raw data consistent with qualitative research's purpose of seeking out "as many differences as possible at the dimensional level in the data" (Strauss & Corbin, 1990).

The researcher set up the tape recorder and made all logistical arrangements prior to each data collecting session. At commencement, the researcher introduced herself and welcomed participants. Name cards were placed in front of each focus group participant. The consent form was verbally explained, including issues of anonymity, confidentiality and sharing of findings for those interested. Participants were asked to read and sign the consent form (see Appendix A) and to complete an eight-part questionnaire (Appendix B). Data requested were: first name, gender, age, level of achieved education, previous occupation, a self-described assessment of health, and yes or no responses to two questions asking: whether they had ever used a computer, and whether they were interested in learning how to use computers. The purpose of the questionnaire was to provide a participant profile. Demographic data are useful in gerontology research to understand the participant within his/her historical context (Luborksy & Rubinstein, 1995). Space for comment with three blank lines concluded the brief questionnaire. Seven participants made comments. Overall, the questionnaire findings from the 27 participants were as follows:

- the age ranged from the youngest at 50 to the eldest at 84 years
- the average age was 67.8 years (two did not respond);
- 16 men and 11 women participated;

- participants were living in the urban community;
- participants gave a positive self-description of physical health, except in one case;
- 19 had high school education (three with slightly higher); four were university degreed; two attended college; one had Grade 9 education; one did not respond;
- 19 had used computers; eight had not;
- 17 reported interest in learning how to use a computer; seven responded negatively; two did not respond and one circled both yes and no.

Participant recruitment took numerous avenues, including group presentations, one-to-one interviews, posters and information hand-outs. Prior to hanging posters, verbal and written contact was made with each facility's program coordinator or director. They were informed of the study's purpose and methodology and agreed to assist with administrative arrangements, including posting recruitment notices, maintaining potential participant sign-up sheets and assisting with meeting arrangements. Their information, insights and assistance were valuable. They also assisted in locating participants, at times suggesting people who they thought might be interested. The researcher presented information on the proposed study, and solicited for participants at three unrelated meetings where older adults were gathered. Handouts were also distributed.

Posters did not appear to be an effective means of recruiting, as only two responses could be directly attributed to this method. These respondents left their names and phone numbers with program coordinators who forwarded the information to the researcher. Phone contact was made with the individuals, allowing the potential participants to ask questions. They expressed interest in participating in a focus group.

They were called with specific details of the focus group (time, date, location); they indicated positive intentions but they did not attend.

Four participants joined the study as a result of group presentations. One called the researcher using the number on the handout; one electronically mailed; two approached the researcher on separate occasions after group presentations. One was initially hesitant to participate but later agreed.

On several occasions the researcher spoke informally to groups and individuals at a seniors recreational centre. This effort was invaluable. Some were interested in the research, others in technology, some wanted to talk but would not participate in focus groups, some said they had nothing to offer. The researcher attended two regular Thursday coffee klatches which generated sufficient interest to form one focus group.

Considerable time was spent explaining what a focus group was. Many were unfamiliar with the term, or they knew the term but had little knowledge of the process and what was expected of them. It was the researcher's perception that the term focus group had images of individuals being the focus of attention rather than being part of a group dynamic. Shortly after, the researcher began using the term discussion group. This resulted in fewer process questions. Those who expressed interest appeared to want considerable information, perhaps to be assured they were not wasting their time or that they had something of value to say. It was felt that this discourse would not compromise the research and could assist participants in thinking about the topic. All focus groups and interviews were conducted at facilities that were convenient and accessible to participants (Romaniuk, 1991). Familiarity with the location can be effective in producing a neutral and safe environment (Frey & Fontana, 1993).

The first focus group was the result of a senior's coordinator observation that a man who frequented the centre was interested in using computers. Contact was made. He introduced the researcher to a group of retirees who met bimonthly. From that meeting of approximately 30 people, eight men agreed to participate and provided their names and phone numbers. A convenient time and room at the senior's centre was arranged and the potential participants were notified by phone. All those who expressed interest attended and three unannounced people who said they were interested asked to join the focus group, bringing the total to 11. The group ranged in age from 55 to 78 years with a group average of 68.3 years (two did not respond). Education-wise, nine had high school; one was university degreed and one had some university. All reported good health; seven indicated they had used a computer and four had not; eight indicated interest in learning, two said they were not interested and one circled both yes and no.

A topic guideline, structured as an inverted pyramid, was used to organize the focus group discussion from broad topic areas to progressively more detailed probes. The topic areas were generated from literature review and informal discussions. The process of data collection and preliminary analysis (Bogdan & Biklen, 1992; Strauss & Corbin, 1990) resulted in initial questions changing to specific probes to elicit detail as new ideas, patterns and concepts emerged. For example, few pieces of research literature connected older adults, technology and family relations, yet, participants introduced this relationship often. Consequently deeper probes were conducted in subsequent data collection.

A colleague attended the first focus group assisting with procedural steps and watching for process data such as nonverbal signs, participant interaction, gestures and verbal nuances. Debriefing included discussion of moderator technique, participant responses and reactions, environmental factors, and topic areas that appeared to require further examination (Krueger, 1994; Morgan, 1988). The assistant noted the effectiveness of addressing participants by name when soliciting their thoughts or returning to a specific individual to elaborate upon a topic which the participant had initiated. It was decided that deeper probing was needed to elicit perceptions about the long-range use of technology and examples of technology might be necessary. The questionnaire was changed to include first names. With the addition of the three unexpected participants, it was felt that subsequent focus groups should not exceed eight participants. Quine & Cameron (1995) suggested eight as a maximum with older adults. Two hours was sufficient time, though most interviews and groups went 30 to 45 minutes longer.

Though, at times, discourse appeared wayward the researcher and assistant felt that stifling this interaction could be damaging to rapport. The researcher felt it necessary for participants to feel they had time and opportunity to share their perspectives. Further, the researcher wanted to be certain that the issues were participant-generated and not researcher-constructed. A critical problem with interviews is that participant perceptions are often interpreted from the researcher's reference point (Briggs, 1986 cited in Brookfield, 1990). Considering the age difference and educational differences, the researcher attempted to be conscious of her presence and her values.

In their focus group research with older physically disabled adults, Quine & Cameron (1995) found there was less interaction and less energetic discussion than occurs with younger groups. In this research, participant exchange was active and on-going, requiring the moderator to make probing interjections and ask questions of clarification. Two functions of the process became apparent: some older adults refrained from speaking until they had assessed the situation; and second, because of discussion overlap and the multi-dimensionality of the phenomenon, keeping discussion systematic was difficult. This resulted in a trade-off between extensive reorganization of data or risk stifling discussion. The former was chosen.

Initially, participants may have been reticent to express their views on computer technology feeling they lacked knowledge. Developing an open, friendly, inquisitive manner that conveyed a genuine desire to hear what they had to say appeared important. The moderator felt that participants perceived her to be technically literate, perhaps because of her age. Direct and indirect allusion were made of the researcher's age and the researcher was assumed to be able to answer technical questions. If this speculation were accurate the perceived age and ability of the moderator could impact upon participants' perceptions of the moderator's ability to empathize and understand their views.

Subsequent focus groups were formed with the assistance of program coordinators at two city senior organizations. In one case, an administrator called two people she believed might be interested in the study; they agreed to talk with the researcher and the researcher was given their names and phone numbers to contact. Repeated attempts to contact one potential participant were unsuccessful. A focus group was organized with the assistance of the other contact.

After a phone introduction, followed by an at-home visit with another potential participant in attendance, the contact agreed to ask several people living in the retirement village to participate in a focus group. He was given an information handout which included a description of the participant characteristics being sought. He said he did not know their personal views on computer technology. The group had two males and four females (two sent regrets). They ranged in age from 50 to 69 with an average of 62.1 years. Four were married couples. Though the 50-year-old participant was the youngest in the study, she was the most vocally anti-technology.

The focus group was 2.5 hours, conducted from 7-9:30 p.m. around the dining table. Of the participants, two were university educated teachers, three were high school educated and one did not respond to the question. All but one participant responded affirmatively to having good health; four responded no to having ever used a computer and 5 of 6 participants indicated no to interest in learning to use computers.

These responses were of interest because from the focus group it was apparent that two participants who responded no to using a computer actually had. And one participant who said he was not interested in learning, used a computer at work and had bought a home computer several years prior. He found the computer was not sufficiently powerful and subsequently the computer manufacturer went out of business. There was a suggestion of bitterness as he felt misled by salespeople.

The third focus group was organized after two personal meetings with a coordinator at a large senior's centre. It was agreed that volunteers who had been trained on a basic computer registration program would be solicited for their interest. The employee agreed to recruit from 5 to 8 older adults based upon the provided criteria.

The two-hour afternoon focus group was conducted in a semi-private room at the centre. Five women attended ranging in age from 69 to 84 with an average of 75 years. One participant's daughter notified the centre that her mother was ill and would not be attending. Two had college training, one reported studies beyond high school, one had high school and the eldest woman had Grade 9 education. All responded affirmatively to being of good health and having used a computer though one added in writing "a very little". Four responded that they were interested in learning, one did not respond but commented in the provided space that she had used a computer at work for seven years.

Three interviews were conducted. In two cases the intent was to have small focus groups with four participants; however, because of scheduling difficulties and several participants not showing, they became two-person interviews. Potential participants were recruited individually although, in one case, when the interviewees met they found they knew each other from years back. One interview was with two women, ages 69 and 66; one worked as a bookkeeper (Grade 12 education) and the other woman was university graduated and previously employed in middle management at a library. Both had some computer skills. The second interview was with two men, aged 65 and 59, both held Grade 12 and were proficient with computers having used them since the 1970s. The third interview was with a 75-year-old, high school educated man who had worked as a specifications writer, and learned to use a computer in retirement.

Participants from one of the two-person interviews and in the one-to-one interview were recruited after approaching the researcher following group presentations. They expressed an interest in the study. From the preliminary introductions it was apparent they had extensive computer experience. A decision was made to include these potential participants in the study with the knowledge that their experience exceeded the criteria originally set out. It was felt that these participants offered insight into understanding older adult learning because of their learning and because they were helping other older adults learn technology. It was decided not to include them in focus groups where homogeneity of computer literacy would be disrupted. All the interviews were conducted in meeting rooms at a city-owned and operated seniors' centre. They were semi-structured interviews addressing topics identified in the focus group guide. As with the focus groups, interviews were 2 to 2.5 hours in length.

Focus groups and interviews were conducted between February and March, 1996. The researcher began transcription of tape recordings immediately, continuing into April. Conducting research in the winter months did not appear to be a factor hampering participant mobility, although potential participants may have left the city for warmer climes. Data collection in summer months may be compromised by the temporary disbanding of organizations.

Assuring participant confidentiality and anonymity was important to the integrity of the research. Participants were identified by initials in the tape-to-text transcriptions and given pseudonyms in the data presentation. Care and attention was taken that confidentiality was not impaired when using quotations with specific names or places.

Data Analysis

The purpose of this section was to present an overview of the theory supporting data analysis in the research literature, followed by a description of the process used in this study. This section has two subsections: Discussion and Process.

Discussion

Codes are the precursor, the building block, to illuminate discovery and begin "the interpretive processes of describing relevant units for analysis and dimensions of meaning" (Luborsky & Rubinstein, 1995, p. 103). The purpose of coding is to identify and collapse data into distinct and manageable units that can be queried, compared and contrasted (Strauss & Corbin, 1990) to produce a thematic organization of the data, necessary for analyzing, interpreting and substantiating generated concepts (Knodel, 1993). The codes are cue words or phrases the researcher uses to identify and represent phenomenon uncovered in the data (Strauss & Corbin). Coding is a process of discovery, integration and change (Luborksy & Rubinstein).

> The discovery-oriented goals, use of meanings as units of analyses, and interpretive methods of qualitative research dictate that the exact factors, dimensions, and distribution of phenomena identified as important for analyses may not always be specified prior to data analyses activities (p. 108).

As a preliminary phase in working with the data, coding sets the direction for the analysis. The codes can be changed and elaborated upon later (Bogdan & Biklen, 1992; Knodel, 1993; Strauss & Corbin, 1990); however, they must maintain the integrity of respondent intent and appeal to a systematic process of analysis.

As phenomenon with related meaning are identified and marked by similar codes, internal patterns emerge from the text data. The various codes are brought together or collapsed into conceptual groupings called themes. The codes merged into themes have characteristic likenesses that give body and substance to the refining themes. Subthemes are used to support the themes.

Strauss & Corbin (1990) define two attributes of a category (or theme): it must contain similar properties and the properties must have dimension, that is, the properties can be described in terms of intensity. The process of coding and categorizing phenomenon into concepts is referred to as open coding (Strauss & Corbin). Attentiveness to coding, in line by line detail, produces greater specificity; however, as patterns begin to emerge coding may be done more broadly (Strauss & Corbin). The impetus for detailed coding rests in the researcher's ability to ground the concepts in the data, ultimately leading to substantive theories.

As the analysis becomes robust, the researcher develops tentative summarizing statements of relationship (Strauss & Corbin, 1990) between the emerging subthemes. Statements of relationships are interpretations of the findings. Consequently, the specificity of the details of the data drawn from the focus groups evolve as analysis becomes more refined and until theoretical saturation is achieved (Bogdan & Biklen, 1992; Strauss & Corbin, 1990).

Phenomenon that defy categorization are important findings opening up potentially unconsidered ideas (Strauss & Corbin, 1990). The interpretative process is aided by early identification of codes and themes during data collection and augmented by (Strauss & Corbin) knowledge of the literature (Bogdan & Biklen, 1992) and sensitivity to the methodology (Strauss & Corbin). External parameters influence data analysis. For example, researchers using focus groups are not fully in agreement of the use of individual voice versus group expression.

Because focus groups are an interactive and dynamic process, the outcome of the group exchange will reveal ideas, opinions and perceptions not previously considered, as well as modifying old ideas. For academic research purposes, unlike some marketing techniques, it is not meant that focus groups be used to develop consensus, but to enlarge the scope and breadth of thinking on a phenomenon. Researchers then wrestle with a problem of whether expressed opinions are the individual's or that of the group's.

Carey & Smith (1994) consider three units of analysis within focus group data: the individual voice, the group, and a comparison of individual and group data. This is juxtaposed by Crabtree et al. (1993) and Morgan (1988), who contend that data collected from focus groups are a result of group dynamics and must be treated as a group outcome. Group data are informed by participant interaction and the sequential nature of discussion, producing contextually specific responses. Data are influenced by the dynamics of group interaction upon individuals, including groupthink, censoring and conformity. Carey & Smith concur that individual perceptions must be contained within the focus group context; however, individual's responses and behaviors may stand alone. For purposes of this research, considering that development of consensus was not desirable, individual voices were drawn from the data and reported in the text.

There is little discussion about criteria for determining priority of concepts emanating from collected data. Though quantifying data may be useful in some qualitative research, Strauss & Corbin (1990) caution its use. Morgan (1994) espouses a quantifiable approach in which a numerical value is attached to codes based upon frequency. Krueger (1994) cautions that frequency--the number of times a topic is mentioned--is not confused with extensiveness, the number of participants who discuss a topic. In either case, frequency and extensiveness can be misleading when determining importance and should be supported by other sources. Responses that are specific and backed by first-hand experience should carry weight (Krueger).

Focus group research has identified means of validating methods, integral to developing confidence and veracity in the research findings. Conducting more than one focus group or a series of focus groups (Krueger, 1994) on an identified research topic is critical to gathering breadth of data and assuring that the group is not influenced by internal or external factors that produce extraordinary results (Krueger, 1994; Morgan, 1989). Group dynamics can result in disequilibrium when one person dominates or the group lacks structural homogeneity. Research suggests there is no magic number of focus groups; however, after two focus groups a solid foundation of ideas should be apparent, and three and more can lead to theoretical saturation (Krueger). The number should be based upon the desired breadth, the efficacy of the collected data, as well as time.

Validation is rooted in the similar experiences and behaviours that emerge from the data across sample groups (Albrecht et al., 1993). Secondary sources of data, including literature are used to corroborate findings (Fuller et al., 1993; Strauss & Corbin, 1990).

Process

All focus groups and interviews were tape-recorded and transcribed verbatim by the researcher. Transcribing began soon after each data gathering session; however, not enough time was allowed between sessions to complete transcriptions before the next session. Allowing for more transcription time may have permitted greater integration of data, analysis and subsequent questioning.

Transcripts were double-spaced, line numbered, and a 1.5 inch left margin was allowed for handwritten notes. The transcripts were gathered into a binder. Spontaneous thoughts that arose during transcribing were inserted between participant discourse either by offsetting the text with brackets or using italics. These insertions were useful memory triggers as other participant perceptions were immediately integrated.

The initial phase of coding began with a line-by-line analysis of the data of one focus group, one two-person interview and the single-person interview. This is consistent with Strauss & Corbin's (1990) initial use of line-by-line coding until patterns emerge then coding is done more broadly. Focus group and interview data were coded and analyzed similarly. Coding was done more broadly in the two remaining focus groups and interview with emphasis on the corroboration of findings and attentiveness to new perceptions.

Codes emerged from single words, phrases, paragraphs, and segments of discussion. Coding was organized using an Excel spreadsheet program. The process involved working between the transcript hardcopy and the spreadsheet. As the text lines were scrutinized for meaning, a one-word code was used to describe conditions of the phenomenon, such as feelings, learning, personal beliefs about ability to learn, support and influences. The code word was inserted on the spreadsheet as a column heading and related text was inserted beneath in a cell. The codes were liberally chosen with the knowledge that they would be synthesized and collapsed later.

Along with the text line number, salient portions of the text were written into the cell. Text was placed under a code if it had a contextual meaning or if it contained specific words. Consequently, text could be cross-referenced under several codes at one time. For example, discourse about a family member telling a parent to read the VCR manual would be coded under family, manual and learning. It may also be coded under frustration or self, depending upon the participant's expression, perception or action.

The spreadsheet had some organizational advantages. One could move about the data quickly and copy data to enter into another cell under a different code. It was easy to set up new codes and join codes together. When there was doubt whether text was useful or meaningful, it was quickly inserted under a code and not readily forgotten. The spreadsheets were printed and put into a binder. It was also easy to move into the wordprocessor and, using the hardcopy as the working document find passages, copy the passages and move them into building the document text.

A negative perspective was the limited space within the cells. Even so, a sufficient amount of text could be inserted to trigger thoughts for quick reference to the original text. Knowing Forkner shorthand, the researcher was able to type in a facsimile shorthand and maximize use of the cell. As with the transcription from tape to written data, spontaneous thoughts during the coding were directly recorded to the word processor. These notes were critical to working through and developing themes and subthemes.

As themes emerged a two-dimensional visual conceptualizations were drawn on flipchart paper. This conceptualization was integral to organizing, linking and envisioning the relationships between the themes, subthemes and codes, and later the two major categories which were an umbrella to the themes. The visual conceptualization was redrawn as the themes became apparent and the subthemes were reorganized. Because the codes were not discrete in meaning or interpretation, the visual was a useful tool for identifying and illustrating interrelationships.

As the data were analyzed and text coded, dominant themes became apparent, much as a ship appearing through shifting fog. At times the images were clear and then, as if from staring too long there was doubt of what was emerging. As a ship parting the mist reveals dominant features before the rigging and woodwork is visible, the themes of analysis foreshadowed the intricate details that made it solid, interesting and substantial. The themes emerged before the intricacies of the subthemes became clear, just as the mast and skeletal features of the ship are seen before the iron railings and the finery of the deck. All the same they are understood to exist but not with clarity. The outline of the ship is as the themes of the analysis, constructed of elemental building blocks not fully seen or immediately understood. The movement between inductive and deductive reasoning and questioning (Strauss & Corbin, 1990) is essential to phenomenological research.

It was necessary to clarify and set priorities consequently some subthemes were not included in the written presentation of findings (Strauss & Corbin, 1990). Six themes emerged, three were termed predispositional: Self Concept, Family Interaction, and Social Functions; and three process themes emerged: Speaking the Language, Knowing the Basics and Accepting the Complexity. The extensive use of quotations is suggestive of the richness of the codes from where the subthemes and themes are ground. To conceptualize the meaning of the themes as educators and planners, the themes have been brought under the cupola of learning predisposition and influences of the learning process.

The learning predispositions consider the individual's self concept as a learner, the influence and support of family, and the community where participants were likely to encounter technology. The learning process reflects the initiative and action required to learn. The following is a brief explanation of the themes and an example of the code words collapsed to form subthemes.

Codes within the theme, self concept, reflected self images and views of one's self as a learner. Code words included feelings of frustration, fear, and stupidity and conditions such as change, control, adapting, self-esteem, knowledge, old, and independence. From these codes, three subthemes emerged and are expanded upon in the findings: confidence/doubt; control/adaptation; purpose/motivation.

The theme of family influence emerged from codes: family, generations, communication, purpose and influence. Two subthemes emerged: influence and support of children and grandchildren.

The theme, social function, was an expression of the conditions of the place where older adults experienced technology, learned about it (or did not), and where some used their talents to help others. Codes pertained to work, purpose, influences, use, exposure, society, involvement, education, forgotten users, displacement, peers, resources, business, communication. From these codes three subthemes emerged: work, peers and institutions.

The learning process was influenced by learning predispositions. This theme considered the conditions of engagement and preparation for taking initiative to learn. Code words included: language, learning, change, the step, keeping up, basics, communication. From these codes three subthemes emerged: Speaking the language, Knowing the basics, and Accepting the complexities.

Chapters 4 and 5 discuss the themes and subthemes, integrating research and analysis with participant anecdotes and quotations.

CHAPTER 4: LEARNING PREDISPOSITION

Introduction

The purpose of this research was to better understand, by exploration of perceptions and experiences, older adults' initiative-taking and responses to learning computer technology, and the implications to their future attempts at learning, including individually and societally constructed barriers.

Learning predispositions make a learning situation what it is, including: the learning environment, attitudes and beliefs, the social and individual environment past and present. They include the baggage that an individual brings to learning. Identification and exploration of factors that impede or enhance learning are valuable to developing instructional practices. For example, past educational experiences impact upon participation in later-life education (Wolf, 1991). Knowledge of predispositions can lead to a better understanding of conditions which would assist or inhibit learning.

Embedded within participants' experiences and perceptions are insights into their learning. These insights can guide future learning initiatives, affecting the quality and extent of life-long learning. From the collected data three dominant themes emerged: Self Concept, Family Interaction, and Social Function. The data is integrated with research and discussion related to the themes. In the text participant names are identified for attribution using parenthesis.

Chapter Four is organized in the following manner: Self Concept has three subthemes: Confidence/Doubt; Control/Adaptation, and Purpose/Motivation. Family

Interaction has two subthemes: Adult Children as Support and Grandchildren as Influence. Social Function discusses three subthemes: Work, Peers and Institutions.

Self Concept

The data suggested that participants had varied experiences with different forms of technology. Some participants had success and failure and then quit trying (Sandra, Marion); some were afraid to risk trying after hearing stories (Oscar, Martha); some said they would adapt as they needed or had to (Harv, Del, Edgar); some learned to use certain technologies but not others (Barb, Rita, Del, Keith, Ella, Peter); some wanted to learn but did not know how or where to begin (Kate, Keith); for some learning was a meandering progression, learning as the need and desire arose (Paddy, Gene, Carly) and still others explored with ease and eagerness (Gil, Ned, Oscar). Their experiences and perceptions suggest the importance of one's self-concept to learning technology. Values, beliefs, feelings of control, confidence, frustration and self-efficacy were found in the stories.

The theme Self Concept focused upon perceptions and experiences participants had of technology, interpreted to understand how self-concept affected their engagement in learning. When participants interacted with or talked about technology it is almost certain that considerable thought preceded their actions and words.

Self Concept, as a theme, is organized in three subthemes in the following text: Doubt/Confidence; Control/Adaptation and Purpose/Motivation.

Doubt/Confidence

Older adults may perceive an erosion of the value of experiential knowledge. With technology's emphasis on the newest, the fastest, the most efficient, the value of experiential knowledge may have decreased, concomitantly the devaluation is reflected in self image (Stokes, 1993). Some participants spoke of feeling "dumb" or "stupid" after encounters with technology. Participants were conscious of their lack of knowledge and technical skills, suggesting conflict and dissonance from feeling "overwhelmed," "lost," "frustrated," "afraid," "scared," "intimidated" and "fear". The impact of these negative feelings may affect older adults' willingness to enter future learning situations. An example is Gene's sense of being a "dummy".

> The kids, your grandchildren, are the ones who have asked you things and you feel like a dummy. You don't even know how to turn on the machine they are playing (on).

Similarly John felt stupid when, in a public place, he did not know where to find help:

> When I saw that computer I didn't know how to start. You know everybody passed the gate, they were going to a certain place and had a certain number. I was lost. I'd never seen that before. You understand, like you are stupid when you are with the other people because I had to ask, 'How do you use that?'

Similarly, a participant's viewing on programming a VCR: "The trouble is you don't understand how it's done and you feel stupid." Kate, 68, was trying to operate an obsolete 10-year-old computer she bought from a friend. She was confused and frustrated with the computer's start-up and operating disks:

> I've been going through all these disks. (My friend) keeps on teasing me and I'm a little embarrassed to tell her I don't know what the heck I'm doing... It is frustrating and I thought the reason I bought it, you know, I thought I could do it but I can't.

Rather than questioning the complexity of the computer, the lack of learning opportunities (Battersby, 1985; Eilers, 1989; Shivola, 1985) or the poor quality of manuals (Gerver, 1986), Kate assumed responsibility for not being able to operate it: "I guess I'm not computer literate, I don't know what they are telling me." Older learners were more likely than teenagers to assume they made a mistake when computer terminals malfunction (Elton, 1988). Kate minimized her knowledge, skills and ability to learn.

Sandra summed up her inability to learn to personal failure: "I couldn't understand the workings of (computers). I just couldn't. I think I just had a mental block and can't do it now." Barb, spoke in similar terms: "I just have a mental block when I run into a problem." Ella assumed her abilities, rather than her malfunctioning answering machine, were the problem: "So I'll have to get that fixed then, eh? I thought it was my fault."

In the preceding passage Sandra, Barb, Ella and Kate doubted their abilities. They thought they were incapable of understanding. Kate:

> I think in my case I want to (to learn). I want to do it but you never know maybe there is something wrong up there. You know what I'm getting at.

She was pointing to her head, alluding to loss of memory or cognitive dysfunction. Later in the discussion, still mulling over her problem, Kate added, "I'm figuring why is it taking me so long? What is my problem?" This was not unlike Del who perceived age to be a factor in his declining ability: "I would have a heck of a time because my mind, it's not as sharp as it used to be." Important was the perception older adults had of themselves and their learning abilities when placed against technology. Keith discounted his ability to learn because of age, then hastily retracted:

> Question: Can you see yourself as a learner?
> Keith: Not any more, I'm 75 and I'm past it.
> Question: You don't believe that do you? No?
> Keith: I think I can learn yet, and I would like to do it. I would like to be able to do it.

From Keith's change of mind, it would appear that he does not want to believe he cannot learn, but that the social pressures, myths, beliefs that computers are for youth, that he is past his learning prime or that he is being foolish to try to learn quickly surface. He tried to learn to use a computer and a camcorder reading the operating manuals but he could not understand the instructions. The seeds of doubt have been planted.

Barb found her first computer course 10 years ago "very very frustrating. I was so frustrated over it." It wasn't until she had an opportunity to apply what she learned and work at her own speed that she gained confidence. "I think my computer learning didn't start till I had a machine in front of me and I was alone." What did she get from the class? "A very frightening negative, but then maybe they were just really starting to teach it then, or else they had a very poor choice of teachers." She explained:

> I was really uptight all the time. They kept saying be very, very careful because if you do this you will lose everything you've done. And that was stressed I am sure four or five times a day so that you were afraid that you could damage, that you were going to lose everything. And it really slowed down my progress I'm sure because it seemed like we were forever being cautioned and I was afraid of the machines. And I remember in our test, our exam, the last one I absolutely froze. I broke down at the computer... I started to cry and one of the girls took me out and walked me around the block. I mean one of my classmates she was just wonderful to me. She was a younger girl; I was the oldest one there.

Barb's language is riddled with negative feelings and connotations of being "uptight," "afraid," "stressed," fearing she would "damage" the computers, "absolutely froze" "slowed my progress." Research suggests that first training experiences are critical to attitude development and may impact upon continued attempts at learning (Czaja et al., 1989; Morris, 1994; Zandri & Charness, 1989). Barb persisted.

Attitude change appears to be influenced by the quality of the learning experience, reflecting upon the appropriateness of the training strategy (Charness et al., 1992; Jay, 1989; Jay & Willis, 1992; Zandri & Charness, 1989) and the instructor (Carter & Honeywell, 1991). The first training experience needs to be positive and participants need to have immediate successes to "combat their feelings of technological alienation" (Morris, 1994, p. 548). According to Zandri & Charness older learners have difficulty problem-solving and require more instructional assistance, especially when they are first learning to use computers (Hartley et al., 1984). Further, older learners needed up to twice the learning time as younger learners (Elias et al., 1987; Zandri & Charness).

The assumptions older adults accept about their learning and the stereotypes they repeat can become self-fulfilling prophecies (Wolf, 1991). Such perceptions can have a contextual basis in the messages society sends. There are self-limiting overtones in summations of: "I'm just too old" (Peter) and "at my age " (Barb, Kate, John, Del); a phrase that prefaced numerous dialogue. Barb recognized the temptation of stereotypes: "The old adage that you can't teach old dogs new tricks. It isn't true but it is there."

Rita, a regular library user, attempted to operate reference terminals but on successive tries was unable to access data. She attributed lack of success to not allowing sufficient time to learn; however, her self-doubts were compounded by fear that appeared to affect her self-confidence:

> Rita: The trouble is when I go to the library I have maybe 10 minutes and that's not enough time, you know, so I always get hung up and one day, I swear, I'm going to go over there and have somebody show me what am I doing wrong here. I follow the instructions... I'd love to be able to do it. ...I can go down to somebody in the information area and I can tell them what I want and they click away and all this stuff comes up magically. Why doesn't it do it for me?
> Heather: You're just not pressing the right keys.

> Rita: I'm doing something wrong and I would need someone to show me how. These things are probably as simple as can be, but it's the same thing as downstairs (referring to the senior's organization where she and the other participants volunteer.) Some of us were just really deathly afraid of computers... A couple of girls dropped right out of memberships and work now on the reception desk because they didn't want to learn computers.... You know--just absolutely frightened. So I thought I'm going to try at least. But I was afraid of it. I really was and it's so simple but it takes a little while I think for you to think 'Yeah, I can do this' and I'm happy with it now. I think it's wonderful.

Rita's hesitancy to seek assistance may not be uncommon as Elias et al., (1987) found that while older learners had greater difficulty learning a computer program than youth, they were less likely to ask for help. The research suggested that older adults need to become self-directing in their learning, seeking out assistance independently.

Rita may be speaking for others when she laments that people "magically" manipulate computers but "Why doesn't it do it for me?". Rita's experience, like Barb's experience with a bank machine; John's attempt to use a camcorder; Kate trying to run an obsolete computer; Keith learning to operate a VCR; Ella programming her answering machine, and Carly learning to use the transit system's automatic ticket dispenser, exemplify uncertainty about learning technology, at least initially. Their attempt suggested self-confidence and a willingness to try, similar to what Morris (1994) found.

Carly, who finished a degree in education as an adult learner, vociferously rejected stereotypes of age being a limitation to learning, even within a mixed-aged classroom.

> I always felt quite confident you would go into these classes and you'd be the oldest one there. But you did as well as the young people, so I never bought into that because you were old you couldn't compete.

Her success as an adult learner may have contributed to her belief in "life-time learning". On two occasions, Oscar, a 75-year-old computer aficionado, spoke about older adults' fear learning technology; fear of the unknown and fear of not knowing.

> They are afraid. I see people on the Net and I invite them to chat and I'm waiting for an answer, waiting for an answer. Come on where did they go, and I check back and they've hung up. (He laughs). You know, they either don't know what to do or they are afraid to do what they think they should do, or they are afraid to do anything because they are afraid, who knows. And you just have to get over it.

Oscar believed "you have to live with technology and progress with it." He spoke of finding ways to build learner confidence that could ignite "the spark that's going to turn them onto a different level" of thinking. Barb understood the doubt manifest in lack of confidence using a bank machine:

> I wouldn't feel confident but I would go and try it. Honest attempt. And I probably would succeed because the directions are there; they come up on the screen. But enjoy it? No.

Her difficulty was as if "something has been put in front of me" - a barrier. She added:

> But there is that instinct, that inner fear of not being able to conquer it or something. We've gone through life doing all these things that we've done and we've managed and we're not ashamed of anything and all of a sudden we've hit this challenge and maybe it's just a little bit more than our mind can take.

Barb spoke of fear, lack of confidence, self-doubt and the need to enjoy what she was doing. She had skills for mastery recognized by her use of more complex technology. She juxtaposed her preference of human contact to the convenience of manipulating a bank machine. She acknowledged fear of technology and fear of failure. She questioned the use of technology that produced anxiety not enjoyment, suggesting that convenience was not sufficient to making technology valuable--even when she could not articulate why. She drew attention to feelings about learning technology, questioning, doubting, fearing and enjoying it. Barb was not alone in her expression.

This subsection Doubt/Self-Confidence illustrated how technology, in its various forms, generated feelings of self-doubt which may be expected to effect confidence learning. Self doubt was manifest in different ways. It was seen in expressions of a desire to learn but a questioning of ability. Participants appeared to attribute this inability to factors related to aging, such as memory loss and cognitive declines. Doubt was also conveyed in the self-abnegations of being "stupid," "dumb", having "mental blocks" or feeling "these things are probably as simple as can be." In some cases, difficulties learning or even approaching technology were internalized and personalized, without questioning that the technology may have been illogical, complex, or poorly explained and designed. Further, learning and using technology needed to be enjoyable, which may not be so if one is questioning his/her ability to learn. Doubt may be expected to impact upon self-confidence, affecting desire, willingness and ability to learn.

Control/Adaptation

Control and adaptation is explored in relation to change and the adaptive strategies used. For some participants change and control were revealed with words like "forced" and "pushed" which meant acting in ways contrary to what they might have wanted to do or had successfully done in the past. This was seen in bank practices. The exceptions were the computer users; however, they acknowledged the rapidness of change made keeping abreast of technology difficult (Kelley & Charness, 1995). For some, this meant adapting as necessary. Control and adaptation were a concern of the present and the future; and often discussed in context of the past where participants may have felt more control.

Participants responded to technology in a variety of ways, at times confronting and addressing technology; actively avoiding it; passively coping, and sometimes responding in ways that were unsatisfying and self-defeating. For example, electronic messaging and voice mail made accessing and retrieving information problematic for some (Ned, Kate, Oscar, Sandra). Some hung up the phone without the information they wanted. Del's description of technology, reveals the impact of the speed and the degree of change:

> It's like harvesting. Whether you beat it with a stick to thrash it, or you come into the thrashing machines or into the combines, it was a gradual type of thing. But still it didn't effect their minds, their thinking to the same degree as this (technology) does, I think. They were gradual changes.

Change is not new or unacceptable to Del. In fact, change was useful, as he cites the greater efficiency of harvesting methods, but he feels the speed and quality of the change today makes the outcome indeterminate and overwhelming. The relationship between technology, society and individuals that Del reflected upon from the vantage point of age and experience, Beckwith (1989) explores as a scientist:

> Despite general agreement that technology has dramatic social effects, the social sciences remain unable to predict technology's course or recommend appropriate political responses. ...Technology is revolutionary in nature, and thus beyond the methods of normal scientific investigation (p. 323).

Del's view that "they were gradual changes" is underscored by Beckwith's view that technology is "revolutionary in nature" and revolutions produce chaos and have unpredictable outcomes. Del believed that today's changes are "affect(ing) their minds, their thinking". He feels these to be qualitatively different from the changes he experienced. As Beckwith suggests, Del may have reason to feel lack of control.

Participants talked about the efficacy of technology, questioning where it was leading society and the effect upon those who did not or could not learn. Eva felt it was "all or nothing" with technology; Kate talked about technology "cutting us out" and causing dependency--perspectives which have implications for wanting to learn:

> Eva: I think that is what our computer literate society is, either you have access to all the knowledge or you have access to nothing. And the division is totally great. Right now we have libraries and things that we can do by hand, on our own, in our own time we can still get there. ...With computers it is all or nothing and that's what makes me mad.
> Sandra: And it all happens because we don't know how to work it.
> Eva: But some people don't want to know. And if you don't want to know you are denied.

Eva and Sandra perceive options diminish as choices are "denied". Kate wanted to learn to use a computer but like Eva and Sandra she felt external pressure to change in ways she did not want to. She appeared to feel helpless and cut out from making decisions:

> It's cutting us out. It's cutting the senior out then because if we don't want to learn what are we going to do? And I don't want my newspaper on the screen. I really don't. I still want my newspaper in my house but apparently that's where we're heading.

She expressed fear of the future for those like her who were trying to remain independent:

> So we're going to be dependent. I mean we're trying to be independent but we'll have to depend upon people to teach us all this new technology. And are they going to be patient enough to teach a 75-year-old? What about a blind person, a 75-year-old blind person? We assume they will have family to help them, but what if they want to remain independent and their only access is through this computer thing?

Kate assumed that family members would be available to assist but from the data discussed later, families may not be the best and most reliable help being generationally and geographically separated. Even while adapting to change, Kate felt loss of control.

Similar concerns are recognized in statements such as "being forced to do things" feeling "loss of control" and "I have no control". The following suggests this loss:

> Moderator: Do you think a time will come in the future that you will feel a sense of loss of control with all the technology?
> Kate: Which we're already feeling.
> Moderator: You are nodding your head.
> Sandra: Yes
> Eva: Yes
> Peter: Yes. As we get older we have less needs and a new generation will come up with that knowledge and we will just gradually disappear.

At 69 years, Peter can expect to more technological change before he and others like him "gradually disappear". Several participants expressed concern about their wives' dependence and what it meant for the future:

> Del: No doubt about it (my wife is going to get left behind). That goes back to what we were saying, the banks are going to force her. If I die tomorrow or something like that, she's in trouble. She's not going to be able to do it. She'll be so frustrated that she'll have to call upon her kids.
> Abe: That's what my wife says. She won't use the banking machine or anything like that.
> Keith: My wife is the same. She doesn't want to go to the bank. She doesn't want to do the shopping. I do the shopping and I go to the bank.

The movement away from "human contact" or "personal touch" evoked disparate responses. For some, technology made it difficult to access information. Participants expressed frustration and resignation with such comments: "A machine won't answer my questions," "And you couldn't even ask anything" or Del says of his wife: "She says I hate talking to a machine that won't say, 'No, no that's wrong.'" Some participants knew they were missing information, but they would not know the quantity or quality.

Those who could benefit from technology as a support to independence may be least able to access it. Nonusers may not be able to make informed decisions about the value of technology if they cannot access information. Technology can enhance older adults' independence, yet, findings show as the need for technology increases with age the ability to use it decreases (Chappell, 1993). Learning, and the anticipation of learning, creates a discomfort; not learning evokes discomfort wondering from what one is being excluded. Del expressed the ambiguity in the push-pull of technology:

> I think some of us are frustrated that it is pushed on us, and we don't want to learn certain things. But we learn what we have to learn in order to get by. Basically we don't want to do certain things, and we won't do it. We're not forced to.

Jake supports Del's perceptions:

> There is no pressure on us to know the latest technology. If we want to embrace (it) that is our choice. It is not a demand, we are not forced into it.

He cites cohort differences saying youth's employment future depends upon knowing; older adults' does not. However, Del and Jake's words convey ambiguity. Neither felt the need to change yet, the choice of words like "force" suggested they were feeling acted upon. External forces out of their control were affecting decision-making. Edgar had a more resigned view of the future:

> I think we have a faith that these changes are going to come about gradually enough that we are going to be able to adapt in our lifestyle to cover it. So much of what they talk about today we are not going to be concerned with it at all. We are either going to be gone or it just won't impact us.

Though Del said he was not fighting the change, during the focus group he spoke on several occasions about being frustrated:

> Del: I don't know, I will just accept it that's all.
> Dick: In the end what more can we do?
> Del: Well you can't fight it, or you will be really frustrated if you start fighting it.

Del later added: "I think some of us are frustrated." Oscar, however, had a polar perspective, asserting that individuals can have control by taking initiative:

> You have to look at it, evaluate it and see how it can help you and if you don't have any use for it fine, don't use it. Nobody is going to force you to use it, at least, generally speaking.

Participants who had some background using technology felt they could access information as the need arose. By example, they spoke of skills being transferable to different settings as was their confidence to tackle unknown technology. For example, Ned encountered a computerized reservation system in Chicago airport. He left the queue of frustrated people and found an alternate solution. Later, he returned. His rejoinder: the technology had its purpose; however, instructions were lacking, the symbols confusing and travelers would suffer because they could not access information. He chose not to be one of them. Barb was also prepared to look for the value in change even though some of her learning experiences with technology were not enjoyable:

> I think high technology and computers are here to stay and I think if we're going to survive and be part of this world we're going to have to accept it and enjoy it, because it's ours to enjoy.

To Carly change didn't come without effort:

> There's so much change right now, and it's changing now much faster than it was.
> Question: Does that bother you? Fear or concern?
> Carly: No, but you sit up and realize that you have to be really working to keep up to it.

The subthemes of control and adaptation were revealed from participants' experiences and perceptions relating to change, loss of choice, feeling "forced to" learn or risk being excluded. While technology meant change, participants took varying perspectives of how and when they would adapt to that change. For some, their response was to make conscious decision to resist change; this would take effort in itself. Control and adaptation were subject to time and context in that some spoke of learning only when they had no other options, such as might occur with bank technology. Adapting and maintaining control were paradoxical. As change occurred maintaining control required adapting and "not fighting it" yet, in adapting there was loss of control. And not to learn could negatively impact upon independence. The disequilibrium may be intensified with technology's rapid change. Such situations should concern adult educators. For example, if information is conveyed by bank machines and older adults are typically not users, they may become isolated from sources of knowledge that could be important to life decisions.

Purpose/Motivation

Reasons for learning technology were neither simple nor singular. Articulating purpose may come only after individuals have learned to use technology, can see the outcome concretely and can reflect upon their learning. Without exception, only the computer users included technology in their future well-being. For example, computer users like Oscar were often asked what they did with their computers:

> I've had people ask me, 'Well, what do you do with yours?' You know. Well my first reaction is that, well, I do everything with my computer that you do without one, and I do it faster and with less effort. And I just let them think about that for a little bit... It's just a more efficient way of doing things and a lot easier.

And Gil:

> To have a computer and to think that all of a sudden you're going to find things to do with it, you're not. You have to have the things and use the computer to make them easier. ...What do you do with it? How do you explain that? You just use it as an every day tool... So it's not that you're a computer geek, but if (friends) want a phone number they phone me because they know I've got it right away. But it's just that: what do you use it for? What would I use if for? And you can't tell them that.

Gil, Ned and Barb learned to use computers while employed, continuing to adapt and use their knowledge in other ways, suggesting a continuity of transferable skills between pre-retirement and post-retirement learning. Technology was a "tool" (Gil, Barb, Oscar) --a means to achieving an end. Participants had personal reasons for using technology, including: keeping up with change, maintaining contact with family (Paddy, Rita, Barb, Oscar, Ned) and keeping the mind active (Barb, Gil, Oscar, Ned, Carly, Dick).

Important to the adoption of computer technology was the relevancy and utility of the technology (Czaja et al., 1993; Edwards & Engelhardt, 1989; Ruth, 1984; Geoffroy, 1994; Hicks & Jaycox, 1976; Morris, 1995). Consistent with Brickfield's (1984) data that older adults use technology provided they find it purposeful, Czaja et al. (1993) found older adults were receptive to using computer electronic mail for communication. Further the computer had the potential "for improving the lives of older people, especially those who live alone and/or have restricted mobility" (p. 205). According to Ansley & Erber (1988) more data are needed to determine whether older adults' skills learning computers are generalizable to other tasks, while other researchers suggest that even a small amount of computer skills are transferable to other applications (Jay, 1989) such as computer-assisted banking (Hoot & Hayslip, 1983). "Mastering such skills and using them on an everyday basis would promote a sense of self-efficacy in the aged user and less dependence on others, as well as making many daily tasks less cumbersome and threatening" (Hoot & Hayslip, p. 495).

For Barb "keeping up" was for personal growth and health, staying current with social change and relating to her family:

> Anything I do isn't going to earn any money, isn't going to substantially change our lifestyle or anything. What I do is strictly now for my own pleasure, my own entertainment, my keeping up with my children and my grandchildren, so I can be intellectually in contact with them, not just some little old lady that is in a rocking chair. I don't want to be just rocking away, I want to be going ahead, and keeping in touch with the people I love and the people around me. I think the computer and the knowledge to use it or any of these modern conveniences, these modern technical things, keep me in touch with what's going on around me. At my age, what's going on around me are very close friends and family, I should say family first and then very close friends.

Gil echoed the notion of "keeping your mind active" similar to Barb's vivid summation: "You've got to keep your mind actively working or it goes mushy." For Carly, and several others, learning to use a computer was part of a life of continuous learning.

> Barb: I think if we're going to keep up with the world around us (technology) is a part which will aid us.
> Carly: And to me the computer technology is only one part, but I think you have to do life-time learning. Life-long learning. I mean regardless of how, you know, it is not necessarily just the computer.

The computer was more than utilitarian-- it kept the mind exercised and a toe-hold in social activities. Interest in computers was consistent with her life view of "keeping active in all ways." As a widow, Carly spoke of the importance of maintaining independence (Baker, 1988).

Depending upon one's ability to use technology, "keeping active" appeared to have two meanings. Advanced technology users (Oscar, Gil, Ned, Barb) spoke of using computers as mental stimulation (Eilers, 1989) and as time saving devices while those with less skills viewed technology as nonphysical and passive activity. Rita, Ella, Eva and Peter spoke of technology as fostering passivity and being time consuming.

Enjoyment may have been intrinsic to those who were active computer users, demonstrated by their interest and apparent willingness to help others. However, not all technology was enjoyable. Barb, an avid computer user, felt she could use a bank machine "but enjoy it. No." She questioned why she would use technology that she did not enjoy. Her query is important because when the process and outcome are not readily seen to be enjoyable then what is to motivate learning? The perceived complexity of learning, along with the expected value for the commitment of time and, for some participants, money, was not felt worth their output. Jake saw no purpose in computers: "So what use really is a computer?" Peter had a similar refrain:

> I don't understand it and I guess I'm just too old to start learning it from the beginning. I know it's essential, useful, very practical for the young people but at my age what am I going to use it for?

Participants spoke of continuing to learn what interested them and they enjoyed doing. What would be the impetus to take on something that is time consuming and difficult to learn, the outcome uncertain, the support variable, and the activity perceived to be unenjoyable? Gil admitted he was stymied for ideas on how to motivate older adults:

> I think the biggest thing with seniors is motivating them to do something. How do you motivate? How do you get them off the chair? That's number one.

Oscar perceived that people got involved when learning was accessible. Research suggests that older adults encounter difficulties acquiring skills because of a lack of opportunity (Battersby, 1985; Czaja et al., 1993; Sihvola, 1985). Oscar tutored with an organization that placed computers in malls for older adults to try:

> I'm sure a lot of people are going to stop and look, and they'll think. Maybe they will just think and forget, or they might take it home and think. ...It just depends upon their own mentality. It just might be the spark that's going to turn them on to a different level (of thinking).

Some described the personal initiative as coming from "inside," "within" and "make-up".

> Barb: It's got to come from inside. I'm thinking of my brothers. It's sort of the way you are and the way you feel.

And

> Oscar: I don't know how to explain but it has to be within the person himself. Some people will drag them on. Like the husband may be hot, hot ready to trot you know and the wife is uhhh, but she's dragged along a little bit and the gap continues but at least the wife does go along with it and does get interested but may be not quite as interested as the husband. Or in some cases, in Eldernet cases it's the other way around. As a matter of fact, when I say the other way around there isn't a husband. A lot of them are widowed. It's something that keeps them from stagnating.

And

> Ella: I think it's your make up. If you are the type of person that's not just going to let something get the better of you, than you're going to learn it.

Asked if she would further her learning Ella responded "I don't think I have much occasion to use that." Identifying a purpose and need for technology is important to learning (Brickfield, 1984).

The theme, Self Concept attempted to illustrate the perceptions individuals had of technology and of themselves as learners considering doubt/confidence; control/adaptation and purpose/motivation. Individuals bring the baggage of past experiences and perceptions to their understanding of themselves as learners and technology. For example, some assumed that it was their fault that they could not operate technology. Some felt technology was being foisted upon society. Some chose to adapt reactively as they had to while others, like Oscar, were prepared to move with the change. Motivation may be dependent upon perceived value, yet opportunities to learn about technology in a way they find appealing may be lacking.

Independence, as recounted earlier, may be reason to learn to use technology. Ubiquity was not reason to learn technology yet the proliferation of technology was inescapable and appeared to affect participants. Because reasons for learning are always apparent (e.g., long-term impact upon quality of life, independence, convenience, enjoyment) older adults' motives for choosing what they want to learn may be unique from other cohorts. For example, Jake pointed out younger people learn because their jobs depend upon technical skills; older adults do not have the same impetus. The data suggested the importance of having a purpose for learning, which may not be easily identified for some with limited knowledge and opportunity to use. Geoffroy (1994) found that: "older adults often have difficulty expressing their technological needs and interests and in assessing equipment or services they haven't had the opportunity to use" (p. 16). This suggests that rejection of technology may be based incorrect assumptions.

Participants did not perceive themselves as being unable to learn. They were aware of the technology around them, and felt the pressure of change. In some cases, they were also captive to assuming learning difficulties were their fault and their problems to overcome. Those who used technology saw more uses and purposes of technology. They were also more circumspect of technology's limitations and advantages.

Family Interaction

The theme, Family Interaction, focuses upon participants' engagement with family members and technology. Participants spoke of differences in technological skill, knowledge and values across generations. Family members were often the subjects of the data discourse suggesting they played an important role in shaping older adults' perceptions about technology. Discussion often focused upon experiences participants had with offspring and their perceptions of the support they wanted but did not receive.

Adult children were often perceived as a source of informal and formal help, and a resource for information. Where action was concerned, perception was not always reality. Paradoxically participants appeared to both rely upon and shy from their children's knowledge and skills. Participants appeared proud of the computer abilities of offspring. There is a suggestion that younger generations may neither recognize their influencing role, nor their potential for support. The family's role in relation to learning computer technology is not extensively discussed in research. The following is a discussion of the data considering the role of adult children as perceived support and grandchildren's influencing learning.

Adult Children as Support

Children appeared to influence older adult's confidence to take on learning (Del, Keith, Kate). The interaction appeared precariously balanced between pride in their children's technical abilities, their need for assistance, feeling vulnerable, feeling that their independence was threatened, and even that their decisions were not appropriate. Admitting lack of knowledge could be demeaning, embarrassing, and damaging to self-esteem. The learning relationship between Keith and his son, an electrical engineer, may be an example.

Keith's son helped him purchase a computer but did not show him how to use it, and further he told Keith to learn by following the manual. (John received a similar "read the manual" response from his children when he asked for help learning to use a camcorder.) The implications to learning are significant, considering Keith was a blue collar worker, his son a professional; Keith was high school educated, his son university educated; Keith learned his trade experientially, his son from studying. Between the generations there were changes in social status, education, instructional techniques and institutionally sanctioned beliefs in learning styles. Other socio-educational differences may be also at play. For example, years of work may have made Keith a cautious learner passively taking in knowledge rather than manipulating and experimenting as an engineer does and as learning technology requires. There is little reason to suspect that Keith and his son's relationship are not typical. Adult child and older adult learning relationships occur around interpersonal dynamics and the hidden effects of social changes.

Keith had a desire to learn and his proclivity was to turn to his son for help. His disappointment was evident. For others support came in different forms and amounts. Barb's daughter helped her learn to use bank machines, set the VCR, and encouraged her to go on the Internet. Barb:

> But you know that fear. You know, I still won't use the bank card. I just look at that machine and I throw up my arms and I go right past the door and wait in line. If my daughter is with me, she stands behind me and I do it, and she says, "There Mom see, it's easy." And then I just can't go back again by myself. I don't know what it is.

Participants spoke of their children's computing competency with pride and pleasure. Ironically, these skills were unlikely to directly benefit some older adults. In the following passage, Del reflects upon why expecting children to help their parents learn may be a pathway to frustration for both parties.

> It's harder for (our children) to teach us because they are beyond us right off the bat. See we don't know the basics and they naturally just think everybody, everybody they know knows the basics. We say, 'Why do you do this and such and such?' Well that's simply because you have to do such and such, but we don't know that. See? And it makes it tough for them. It's frustrating for them as well as us you know, for them to teach us. I really do feel that way. I'm not saying they are miserable about it, but it's frustrating for them because they are so far beyond.

The parent/child relationship combined with the disparity in computer knowledge would make teaching as frustrating as learning. Kate's view is similar: "Kids really don't have the patience to teach their old folks on computers." Kate's daughter exposed her to word-processing, whetting Kate's appetite to buy a personal computer. But what Kate thought would be a "cinch" became an exercise in frustration. Kate told friends about her difficulties, but she did not tell her family "because I don't want them to laugh at me." Keith expressed frustration similar to other participants who recognized their children's skills and knowledge and also their perceived failure to support:

> I have two computers, two printers and a thing for checking cards in my basement. I don't know how to use one of them. My son says why don't you get that darn computer out, and I said: 'Which end do I plug in? I don't know anything about the darn thing. You come home to visit, and you're running here and running there, take an hour and get me started on the darn thing'.

A participant followed Keith's comments suggesting that Keith's son lacked patience and an understanding of older adults. The participant told Keith: "He can't even be bothered to teach you because he is so far way ahead of you and he doesn't have time for you."

This echoes Kate's perception of her children: "They are way beyond me, honestly."

> Kate: I wouldn't dare tell them I haven't done it yet (got the computer operating). They ask me how I'm doing and I say great thanks.
> (Group laughter)
> Kate: I lie a lot. I really do.
> Question: Why do you lie to them about it?
> Kate: Because I don't want them to laugh at me.
> (Group laughter)
> Kate: No, I really feel frustrated. I'd love to be able to... When I got it I thought 'Ha, cinch'... now that's eating at me.

Marion felt similarly overwhelmed and frustrated, and abandoned by her daughter:

> To come in front of the computer, turn it on, push a little button here and all of a sudden you are sitting at that screen, but they don't have the patience to sit there and say to you, 'Well... (Marion hesitates, and looking at another participant says:). Am I right about your daughter, too? They just sit there and say, 'Well?'

Marion had no technical skills even as far as bank machines, computers or credit cards. She conveyed disappointment in herself for not knowing what to do at the computer and in her daughter for not anticipating how to help her. Her daughter led her to the machine, but at the first step to learning, Marion, like Del and Kate felt abandoned and resigned.

Harriet and Ella perceived they were not understood by their children:

> Harriet: Well the computer I've been using it for years; the banking machine I don't want to use it. They think it's funny that I don't. You know they think it's funny Mom won't use the banking machine.
> Ella: My son's the same way, too.

There is a suggestion that they felt judged. However, the issue may have been more than an unwillingness or inability to learn, it may have been perceived usefulness, trust and the efficacy of the technology. From a survey of older adults' knowledge about technology, James (1993) reported that of the 56 questioned, 39% said they had some understanding of banking technology and 18% said they were interested in learning. Anecdotally "many respondents" conveyed distrust of the banking system. According to Peterson (1983) perceptions of older adults need to be tempered by examination of cohort experiences that create life-long patterns. Distrust of financial institutions may be a result of poor technical skills that conflate with memories of the 1930 Depression Years.

Adult children returned to their parents bearing gifts of technology from answering machines, microwaves, VCRs, fax machines, wordprocessors, cameras to camcorders and computers. Rita's son bought her a fax machine thinking it would be easier, faster and cheaper to communicate long distance but Rita insisted she wanted to talk to a person. Paddy's son made a unilateral decision to buy her a word processor although Paddy, 84, said a computer would have "made more sense" because she wanted to be electronically connected to her family. The situation disappointed her and with resignation she added: "At my age, why, maybe it's kind of crazy" to own a computer.

Gene's children wanted to buy him a computer. He was not adverse to the idea; he said he would enrol in computer classes but he was unsure of his children's motive.

> Gene: Every household should have a computer now, apparently. And we wouldn't go out and buy one, but our kids will say to us: 'We'll buy it because you need it'. ...Maybe it's for them to contact us.
> (Laughter)
> Question: Why do they say you need it?
> Gene: To keep us modern I would think and young thinking.
> (Laughter)
> Question: Do you agree with that?
> Gene: I agree, yeah.

Computers are associated with youth--what's "modern" and "young thinking". He wouldn't buy one himself but he would accept their material support and seek out his own resources for learning.

Participants appeared to receive satisfaction and a sense of self-worth when their learning was acknowledged by offspring. The following exemplify the meaningfulness of children's acknowledgments of their parents' learning:

> Barb: They haven't had to encourage me personally. I've done things the way I want to ...and the children seem proud. That always pleases me that they think Mom is hip, you know, that's sort of a natural feeling that you are glad you are still communicating and they think you are a swinger, or not a swinger but in tune with what's going on. I think that lessens the gap, lessens the generation gap if you try and keep up.

And

> Carly: I have two daughters and they just sort of assume, that's Mom, she's going to go ahead and do this and that because I'm always taking on new projects. They are very encouraging but they sort of expect it of Mom. ..But it does make you feel closer to them, you know you're in closer contact with all these things. ...I mean, you feel like you are sharing more with them.

And

> Oscar: It's funny, we have (computer classes and) the first thing (older adults) want to do is get on the Internet and get a hold of their sons or daughters who are somewhere else and send emails back and forth.

Participants often appeared torn by expectations that their children, with their knowledge and skills, would provide practical support for their learning. When children did not respond accordingly, participants appeared to struggle with their feelings about expecting them to help and maintaining their independence by learning on their own or finding their own resources. Sometimes these experiences were no more positive. Participants perceived that their children wanted them to enter the electronic age and to be "young thinking" as Gene said, from the gifts they gave. But participants seemed to feel decisions were being made for them and they were left to figure out how to operate them on their own.

Grandchildren's Influence

The technological relationship between grandchild and grandparent appeared different from that of adult child and participant. Grandparents appeared to receive vicarious pleasure from their grandchildren's abilities and delighted in recounting their computer accomplishments. At the same time, some participants were concerned with their grandchildren's dependency on technology and their lack of "basic" knowledge.

Grandchildren offered invitations to learn, but older adults like Paul and Kate were reluctant guests. Kate believed her grandchildren wanted her to learn to use the computer so she could "be as smart as they are." Or, as Sandra suggested, because youth enjoy computers "they wanted you to try it out and get hooked on it." The actions and behavior of grandchildren may be influential in encouraging older adults to learn or at least think about learning technology, particularly computers, as demonstrated by the following:

> Paddy: My family from my grandchildren and my great grandchildren, they're all computer nuts consequently you have to go with it.

And

> Oscar: That's what gets a lot of people. It's the fact that their grandchildren come over and they are the ones pushing us old gaffers to find out about computers.

Oscar added that computers were "far from older adults' original thinking when they were working or when they got married". Older adults did not have exposure to computers as their children were growing up and “now it’s their grandchildren that are using them.” He suggests, they have to lean across the knowledge gap to communicate with youth.

> If we want to have any communication with our grandchildren we need to know something about computers, too. They are forcing us to learn. ...In a sense the grandparents are now inveigled almost into learning about computers so they can talk to their grandkids.
> Question: And if they don’t learn?
> Oscar: Then they don’t have anything to talk about almost.

Grandparents risked losing contact and influence over younger generations. Oscar:

> I’m not sure if it has any particular bearing or effect if (older adults) don’t learn. It’s just one other communication method that they are not going to be able to take part in. If they are visiting the kids and (the grandchildren) want to play with their computer that’s at home, you are just out of it as far as they are concerned and as far as you’re concerned, too. I’m not sure this is world shattering but it is nice just to be able to make some kind of comment even about what is going on. Grandchildren may know that you don’t know anything, or don’t know very much, but they may also not realize that you don’t know it all. If you know anything, why that may be enough to satisfy the kids. They are not going to look down on you.

Conversations would be limited and grandparents would have less in common and risk growing apart from their grandchildren. Oscar:

> I would say they, they are (supportive) but without realizing they are. It’s just natural to them, so they assume it’s natural to you. So if you can do it that’s great by them, but I don’t think there’s any support from the (grand) kids. It’s something they expect from the other third (grandparents).

Grandparents appeared to derive pleasure and awe of the “naturalness” (Oscar, Sandra, Barb) which children had with technology. Barb was incredulous about the abilities of her four-year-old granddaughter:

> She comes over and plays on the computer and it just blows me away how quickly she has grasped things... She says, ‘Papa will you go have your nap so I can play on the computer?’

Half facetiously, Keith explained how he learned to use the VCR:

> I bought a VCR and my five-year-old grandson puts stuff in there and operates it. And I can't. The thing to do is watch what the five-year-old does and learn it quick.

Apart from participants' concern that youth were overly dependent upon technology and did not have a grounding in the basics of language and mathematics (discussed later), they spoke enthusiastically and with wonderment of youth's natural proclivity to technology. The influence of grandchildren appeared to be vicarious. Their naturalness with technology may be disarming; it may also be less threatening.

The theme Family Interaction focused upon participants' perceptions of their children as resources and support for learning. Though it appeared older adults felt their children should be support, in practice this was not necessarily the case. Although the data would suggest that some participants felt their children were supportive of their learning technology in theory, but they could not or would not show them how. Grandchildren appeared to be influential in inveigling older adults to learn, primarily to maintain communication bonds.

The older adult, family and technology triad appeared ambiguous, even paradoxical. The paradox was suggested in older adults' perception that children, with their access to, comfort with, and knowledge of technology would be resources to learning. In some cases children were active participants in their parents' learning and at other times they provided encouragement. In some situations participants did not seek out familial assistance or when they did, sometimes the outcome was unsatisfying. Regardless, the family played an important role introducing older adults to technology. This role may have been as passive as buying gifts to being a source of second-hand information from overheard conversations and watching offspring use technology. Family was a measuring stick of the breadth of the knowledge gap between generations even for the technically literate like Ned who, after 17 years of computer experience, watched his children's skill speed by his considerable abilities.

The dynamic of the adult child/older adult relationship appeared to have the potential for stymying or encouraging learning. Jay (1989) found that attitude change was greater when older learners had encouragement and family support to learn a computer; those whose family responded negatively reported less positive change. Cross-generational computer training programs which involve family members may be effective for older learners (Danowski & Sacks, 1980; Jay, 1989). While adult children may have accounted for barriers that made learning difficult for their parents, participant perceptions did not suggest this.

The family's influence, tied to communication and self-worth, is complex and ambiguous. The stratification of each generation, apparent in technology related knowledge and skills, may be exacerbated by feelings related to independence, inferiority, inadequacy and vulnerability.

Social Function

As a self-employed entrepreneur Ned, 65, recognized the need to adapt his engineering company to computer technology. Having aged along with newer and more powerful computer technology, Ned was unique to many of his contemporaries who never learned. Ned was empathetic of those like his mother, his wife, and friends who tried to make sense of technology, whether that meant watching them struggle to understand manuals, take a computer course, use electronic security systems, computerized airport registries, electronic banking or other technologies about which he talked. Ned was personally affected by the far-reaching, and initially unseen, impact of technology:

> You know how in the last two years the government has changed its telephone system, like say phone for your taxes and stuff like that. Well, when they first came out with that and they were changing a bunch of the seniors stuff back, what 2 or 3 years ago, I was away and we didn't get back until July and there was a bunch of forms that Mom was suppose to have in by the 30th of June. I think that was their deadline. She didn't have any of this in. So I said to her, "Why didn't you just phone on it; there's a phone number."
> She told me: "Well you've got to start pushing buttons and I couldn't get through. And that was frustrating."
> So we were sitting there; she was having lunch. She was living in the lodge down there. So I got talking to her and showing her what she had to do. I said we'll go upstairs and we'll get this all done and I'll talk to them and find out what has to be done now that you're late.
> Well, a woman sitting there said, "Can you help me?" Before I knew it I had about 20 of them. So I phoned up and I said, "You've got to do something with this system. You've got a bunch of people here that are way behind. Now I can help them, but tell me what you want done." Oh, and I said, "If I have 20 people in one building, what happened to all the seniors around the city?" The woman from the government said, "We're getting a lot of complaints. Would you go on a committee and help us?"
> See it is all right for you or myself to say what seniors over there can do and what they should be able to do. But first of all when you come out with an idea like that you set it in front of them, say now can you make that work. Don't send the whole country into that kind of turmoil.

As a manufacturer, Ned knew how errors occurred from making assumptions about technology, from the basics of knowing how to turn on equipment to having people with English as a second language read the manuals he wrote. He was adamant that poor planning and communication, not the technology, was inadequate.

This section focused upon the external predispositions to learning; that is, the conditions within the social environment that impacted learning. Greater exposure to technology is expected to produce more positive attitudes (Brickfield, 1984). There was no one specific environment where participants acquired experience; however, work or work-related settings appeared to be important.

The section has three subthemes: Work, Peer and Institutions. This theme looks at the community as descriptive and contextual, viewing older adults as learners and as individuals inseparable from a technological society.

Work

As a subtheme, Work, focused upon participants experience with technology at work, including the skills that were developed and the attitudes formed. The oldest participants in a study such as this may have different work-related experiences and learning opportunities from younger participants because of the rapidness of technological changes. This suggests a need to be sensitive to cohort differences. Some participants who used computers at work indicated interest in using computers in retirement.

For many, their first opportunity to use computers occurred at work or as a result of work. The extent of use may have been as singular as Marion or Kate's experience: "It was a case of turning it on, putting in my number and it had one function," or as complex as moving from pen and ink to computer aided design systems as Ned undertook.

Ten years ago when Barb was 56, she decided learning computers was necessary for employment. She recounted her first "overwhelming" exposure to computers:

> They kept talking about having to get a computer and I was doing all the bookkeeping and everything manually. And I wasn't computer trained so I really backed off because I didn't think I could ever learn that. It was so overwhelming. I didn't even consider it and I don't think they considered me as a candidate. I am sure they didn't.

She enrolled in training; an experience she found "very, very frustrating" but which resulted in jobs. She recalled feeling "proud of myself".

Carly, 69, acquired computer experience working in a library. She never felt she understood the "basics," but she knew that change meant constant learning.

> I always feel you have to keep up with change. Even in the library there has been such terrific change in the last 20 years just in the computer field. But each time they came in you could grow with it, and if you were one of those types who didn't want to grow, well, you might as well just get out of the field. But I think you have to keep growing or else.

After retiring Carly adapted her computer skills to work at income tax preparation. Her skills gave her confidence:

> You feel quite good about it because you know yours is pretty darn accurate. And the fact that you wouldn't allow yourself to be put down by anyone who would say, 'Oh, she's getting over the hill. How can she know how to do taxes?'

Barb also felt computer skills "give you confidence." But to Edgar, retiring meant leaving "that rat race;" a race run by changing technology which Edgar still tried to avoid.

> When I retired I said gawd, I'm glad I'm getting out now just as computers are coming in. I'm happy I didn't go through all that.

Del and Edgar worked in a newspaper--a labour intensive industry that underwent rapid technological change. Edgar, and others in the focus group, spoke about the impact change had upon their jobs, particularly the impact of education supplanting experience.

> Del: When the new technology came in you didn't have time to go to courses to learn how to use it, but all the new people they hired all went to NAIT or where ever and learned these different things.
>
> Al: ..like in my department, I was a technician. As soon as a new machine came in I figured I'll learn this machine but, no way, because before you even got a chance to know this machine there were others, and there was just a continual change. It was pretty hard to keep up.

> Gene: When cold-type (computer technology) came in, it accelerated so fast that it just ruined the profession of a printer. You know a guy working in the composing room trade, if he wasn't able to conform or given the opportunity he was just lost. He lost his job. There were just no if ands or buts about it.

> Jake: There's resentment. I think there is resentment. Oh, I think to be displaced by...(he did not finish.). What took me a life time to learn, they take a two-year art graduate; (they) come in and they sit down and do the same sort of job.

Ground in these perceptions of undermined experience, expressed in terms like: "to be displaced," the need to "keep up" "to conform," to adapt to "continual change," and feeling "resentment"--is a sense of loss of personal control. Perceptions that technology was instrumental in changing their jobs and devaluing years of accumulated knowledge may be expected to impact upon their self image and their attitude to technology. Research suggests that in performance-based studies those who perform poorly and have a poor learning experience tend to have a negative attitude to technology (Czaja et al., 1989). Further exploration would be useful to understand if the attitudes to technology formed at work by near-to-retirement employees effects attitude to learning in retirement.

Learning in retirement becomes a personal responsibility and initiative that may be influenced by external factors. From Jake's perspective:

> When you were working you had to learn. There is no force, no outside pressure saying you must learn when you leave the work force. There is no pressure to upgrade yourself, a desire perhaps.

This may be important to an aging population because of the conflation of life expectancy and quality of life with the degree, kind, quality and speed of technological change.

Like other participants, computers arrived at work as Oscar, 75, prepared to leave. Even so, he felt he wanted to learn to use computer aided drafting as his co-workers were, or he would lose contact with them.

> Every time I saw somebody, why they were just talking computers. I thought no sense fooling around listening to these guys, if I want to keep up with them I've got to get into it. ...They always include me in things but I was getting out of touch. Finally I decided that I just had to buy a computer for home. I have their information, product information system on my computer. I never use it, I look at it, and I up date it. It just becomes practice, but I can find out some of the things that they are talking about which, I think, if you want to carry on a conversation about something you've got to know something about it.

Work-related technology continued to be important to Oscar and Gil, keeping them informed, active and communicating with past co-workers. Gil offered to teach fellow retirees to use a computer:

> Well I tried. Like we've got the retirement group and, and we've got a computer there and I've put out a note: 'Come down I'll show you how to use it' but nobody comes.

He wondered what motivated retirees.

Work was the impetus for many participants to learn technology (Ned, Gil, Barb, Carly, Martha, Harv). As a school teacher, Sandra spent one Christmas holiday learning how to operate a computer. She resented the time, effort and frustration expended for minimal gain. She avoids computers now.

Older adults as seen in this research may be unique because of the conflation of their retirement with the introduction of computers. With computers being almost universal in the workplace today (Kelley & Charness, 1995) many of those preparing for retirement may be expected to have more accomplished computer skills than the samples in much of the current research. Recent retirees will have work-acquired technical skills, but may lose opportunities for continuous upgrading that occurs at work. As a result, older adults may require opportunities for on-going training. Future research will need to reflect the breadth of change across the ages (Kelley & Charness, 1995) as will educators need to prepare for groups of older learners with a range of technical skills and interests.

Peers

This subtheme, Peers is seen through two emerging constructs: first as a cohort that perceived itself as having a unique relationship with technology and second, as people concerned about others, providing technical and moral support.

Some participants, particularly those with experience using computers, reflected upon the perceived uniqueness of their cohort in relation to technology. This cohort was situated between youth who were immersed in technology and typically the old-old who, in the latter stages of life, could avoid technology. This cohort was on the cusp of an epoch where technology crept from fiction to proliferation; where user applications left the laboratory to become ubiquitous at work, at home, with the family, in the community. Gil and Ned's view:

> Gil: I think we're just in this transition period. Now the generation behind us are taking it in school. They're going to go with it. It will be automatic to them. It's only our group.
> Ned: It's our group right now that are going to suffer the most from now and for the next 30 years.
> Gil: Because it's just from say, from the 45 and up now that are in the dark.
> Ned: It's huge (as a group).
> Gil: It's sort of the Baby Boomers. And if you're not an experimenter as such you won't do it.

As experimenters Ned and Gil may be somewhat unique to the cohort they describe. They anticipated that those who didn't learn were "going to suffer" and "be in the dark". Sandra might be one of those people; she was not an "experimenter" as Gil described.

> Yes, I am threatened. It's just going too fast for me. I feel if I were to learn how to use the computer or Internet or whatever the fact is I won't be able to keep up with it in any case. If somebody from a 100 years ago were sitting here with us

> tonight, you know, just think how primitive their life was compared to with what we have and I'm excluding computers, telephone and VCRs. Umhhm, I think that's how I feel about the future when you foresee what's going to happen. We are still sort of in the dark ages compared to what's coming up. And that's scary. But like I say, I probably won't be here to see.

The perspective of the two preceding dialogues, from different data groups, is revealing in the disparity of abilities within the cohort. Ned and Gil saw nonlearners as being in the dark; Sandra felt "threatened" and living in the "dark ages". The felt uniqueness of this generation was manifest in the problems of learning without resources. For some like Oscar it was learning on his own a decade ago when computers were relatively new, and for others like Sandra it is learning today as a senior. Oscar, 75, is an example:

> I've found, too, that the next generation down from me isn't having to do as much exploration work as I had to do to get to the same point because they know that there's different ways of doing it. Whereas our generation, right now we didn't have all these advantages. ...Once we've made our visit why the next generation will have less trouble coping I think than today's senior generation.

Gil and Ned had similar experiences when they began learning computers in the 1970s:

> Gil: I didn't know anybody out there was doing it and same as you, there was nobody doing it.
> Ned: You had nobody to go to and boy you crashed things around.

Some participants, like Ned, Gil and Oscar, saw themselves as exploring where others hesitated to go. While others, like Sandra felt "threatened" by where she was being led or for Del where he was being forced to go. The perception of being unique was also intra-generational. For example, of Barb's seven siblings she was the only one who learned to use a computer; "the others wish they could, particularly my sisters but the men sneer." Carly also came from a large family and only she and her brother used computers; Oscar, Ned and Gil had similar experiences. Of those who did not learn:

> Carly: They are happy in their own way.
> Barb: They are happy but in a way I kind of feel sorry for them.
> Carly: Yes, their lives are narrower.

Though users believed nonlearners' opportunities were restricted, there was a perception that technology was not an end all; those who chose not to learn would find other means of accomplishing their objectives. They would "get by" by overcoming obstacles.

> Ned: I think they'll get by.
> Gil: They're going to survive.
> Ned: They're going to struggle.
> Gil: They're going to live in a small circle kind of thing or kind of a shell. But if you've never had it, never tried it, you don't miss it because you've never experienced it.
> Ned: It might not be the best way or the easiest way but there is an alternate way and you are satisfied with it.

The data suggested, however, that non-users knew that their lives were being affected but not to what degree or extent. For example:

> Sandra: I'm just like an ostrich you know. I'm afraid of what's going to happen in the future if I live that long. I hate to think that I won't be able to write to my friends and the letter will get there. I don't think it will be in my life time so maybe I'd better not worry about it.
> Harv: Oh, I think it will be in our life time.
> Kate: Not in my life time.
> Harv: It will happen lots faster than that.
> Sandra: Do you think so?
> Eva: I think so.
> Kate: We're still going to be accommodated. You bet.
> Harv: Oh, yeah
> Eva: I don't know.
> Sandra: I don't know either.

Though not with the same trepidation of this group, other participants talked about watching as others manipulated technology.

Without exception, participants with skills and knowledge using computer technology lent their technical and moral support to others. This included formal learning situations such as organized computer groups (Oscar); informal learning such as home tutoring (Gil); and spontaneously occurring nonformal learning at a neighbour's (Ned) or over the phone (Gil). Research suggested that pairing learners was beneficial, providing social interaction and problem-solving support (Danowski & Sacks, 1980; Eilers, 1989; Zandri & Charness, 1989).

Ned mentored a neighbour who had been an active computer user until he was accidentally injured. Ennui kept the neighbour from the computer. Sometime after the accident Ned was visiting his neighbour and they began talking about computer programs as they had in the past. Days later the neighbour called: Would Ned come over?

> So I went over there and sure as heck he was down there and we got playing around on the computer and he was showing this and what he had. He said, 'I'd like to get on the Internet but' he says 'my computer isn't quite right.' Well I said, 'After we get back I'll come over and see what we can do about getting it upgraded so you could get on.' 'Yeah,' he said, 'I think maybe I'd like that.' I said, 'We'll do that.'

Like Ned, Gil shared his skills with older adults. He put up posters offering to teach members of his retirement club computer lessons, but no one attend. He tutored older adults on computers, sometimes visiting their homes or taking trouble-shooting calls by phone. He described his experience with a couple--a retired co-worker and his wife:

> When she would get on WordPerfect or whatever, uhh she could phone and I could bring it up on the screen and just tell her how to change the fonts, or just work that way if she got into a bind, and how to save it and how to copy to a disk. They didn't know anything.

Moral support and encouragement went hand in fist with technical support. For the providers, the rewards appeared intrinsic and the response was altruistic. Gil received satisfaction from helping others:

> Like I have people come over and they come into my computer room and they are all fascinated. I hook onto the Internet and (say) 'Where do you want to go?' you know, and away we go and they see the things I can do.

Barb got a "wonderful feeling" knowing people with poor eyesight could read the large font computer-generated letters she sent.

> I've had so much fun now because when I write my sister she, of course, shares the letter, and I do the big fonts so (my brother-in-law) can read my letter. And that's a wonderful feeling that you are not excluding anybody.

Though Barb said "it was strictly a selfish idea" that she learned to use computers the projects she undertook--generating family history, calendars and cards, computerizing a church's accounts, designing an annual report, inputting her classmates' creative writing onto a computer--is indicative of the time and effort she spent helping others.

Research reports positive social interaction and collaborative learning within older adult computer groups (Danowski & Sacks, 1980; Eilers, 1989; Geoffroy, 1994; Manheimer et al., 1995). Some stressed that technology should not replace opportunities to socialize (Kerschner & Hart, 1984), however, technology was found to produce new forms of intra- and inter-generation interaction between friends and family (Czaja et al., 1993; Danowski & Sacks, 1980; Eilers, 1989), reduce feelings of loneliness, and strengthen a sense of control and influence on the environment (Danowski & Sacks).

The data suggested that participants with skills and knowledge often used their time and talents to directly assist others and/or undertake specific projects. Having acquired the ability to use computer technology, these participants appeared to receive pleasure assisting other older adults. They appeared to derive satisfaction from seeing others either learn new skills or benefit from technology.

Institutions

Institutions are replete with technology illustrated by bank machines, voice mail, electronic mail, self-serve information, ticket terminals and computers. Few provide learning opportunities. Educational institutions driven by cost-recovery programs are discovering the older adult market for courses in computer technology. The following text focuses upon older adults' interaction with technology within social environs, particularly relating to business and educational institutions.

Plaintive nostalgia for the loss of, and continued desire for personal service (Rita, Sandra, Barb, Edgar, Peter, Marge, Ella, Jake) was tempered with the knowledge that automation was occurring relentlessly. This was evident from participants' discussions of financial institutions' automation at the cost of personal contact (Barb, Edgar, Keith, Rita, Kate, Peter) and government and business' reliance upon telephone technology (Ned, Paddy, Rita, Kate, Del). Keith's frustration listening to telephone voice commands end with "no answers at all. I think they are treating the public with disdain." And as far as encouraging older adults to become computer literate John felt:

> The company who made the computers are not interested in older adults because they say here today and gone tomorrow. But the young people that is where they can sell it. But you know the percentage of old people is so big and those are the people who have the money.

There was a perception that scant emphasis was put on teaching older adults (Oscar, Ned, Gil). At the same time, some participants spoke of the ease with which they learned to use bank machines (Kate, Carly, Gil, Peter), others expressed fear of the unknown, largely a failure of financial institutions to provide adequate training.

For Edgar technology was like an elephant in the livingroom; he walked around the technological elephant to avoid it. He knew the elephant was in his midst and he coped with the hindrance. Edgar said when he no longer had access to his favorite teller, the one he visited each month then he would change--he would face the elephant.

> If (this service) is gone and I lose that then obviously I have to give in to this computer business and start using my computer cards and all the rest of whatever they have.

For Edgar, and others like him (Marion, Eva, Martha, Keith) losing the service and having to "give in to this computer business" conjured images of standing resolved in a battle that has been lost and the outcome known. Edgar may not be alone in his views; as others saw the elephant of technology sitting in their midst. Sandra coped by walking as "far around technology" as she could. Oscar, a rabid computer user, believed financial institutions were remiss in not providing learning opportunities:

> I think the banks fail to educate the people enough. They tell them you can do this and this, but that's all they do. They just tell you, you can do it. If you go into the bank and ask them to show you, they'll go out with you to it ...and they will punch in a few things. 'There, great. And you do it.' And they leave you there and your mouth is still hanging open you know. I think they need, they need more than that. Even if they had had a spot in the bank where you could go and push buttons.

Further, Oscar believed, businesses may have shirked their responsibility but individuals were also responsible for their learning: "You have to find out. ...Some things are going to be forced on us." However, Oscar's conviction was not inclusive.

> Harv: You've got to blame the banks, or really yourself. When you get the card you should ask them okay how do I use that card? What can I use it for?
> Kate: That's right.
> Eva: I blame the banks for not teaching you how to use that card they keep sending you. You should have to go in and learn how to use it before they issue you a card.

Martha was afraid of bank technology as a result of a friend's poor experience:

> I don't really know how it occurs ...And when I hear people talking about having problems then it makes me a little afraid of going in because I think that maybe I've put something in, pushed one wrong button and you know. ...I don't know.

Yet, Martha was interested in entering cyberspace if she had training:

> I don't know if there is that much learning to (the Internet). I would understand it if somebody would just tell where its brains are.

Martha's perceptions were not unique, she was a "little afraid" of bank machines but confident to try Internet. Some were willing to engage in certain forms of technology but not others. This may be, in part, a reflection of how technology is defined and implemented (Daamen et al., 1990). However, when older adults feel they need to learn, they may not have the resources, support or opportunity to learn. For example, Ella did not want to learn now even though she was healthy, she said she would learn when her independence was at risk:

> I'd rather go to the bank. I have the time to do that, so rather than getting into this thing, I really don't need it. I have time, I have a car and I can go to the bank, so you know, I don't need that. But I guess if I couldn't go then would be the time this would be a good idea.

Peter and Edgar expressed a view similar to Ella. Edgar never considered how such skills might impact upon his future independence.

> I had never thought about the issue. I quickly say no, I'm not interested if somebody asks but I never think about it because I am so happy with the way I've been doing it for 70 years or whatever. I am not interested in it right now.

For some, the timing for learning appeared to be an important consideration.

As an opportunity to learn, returning to the classroom appeared to have some appeal. It also had disaster stories and constructive critics. There were the enthusiasts and the non-subscribers. Within the context of educational institutions, time and the quality of instructional practices appeared to be the most relevant.

For some, the idea of returning to a timetable conjured comparisons of the rigidity of work to the personal clock of retirement. After years of paying homage to a clock, retirement was the luxury of having control over one's time and not restricted by other-imposed schedules. Gil, Ned and Peter, respectively, illustrate the value placed upon personal control of time:

> At this stage in my life I don't want to be regimented by times and organizations. I want to come and go. If I want to work till 4 in the morning I do, and if I don't want to do anything I don't. And I don't want to be somewhere at 8 o'clock and everyday for a period of time.
>
> Don't put a time limit on me. I've spent 43 years on a time limit and I'm not going to do it anymore.
>
> It just doesn't fit into my schedule. When I want to work in my garage, I work in the garage instead of going to the college.

Scheduling was more important to Carly than whether the course was with cohorts: "..it's just whatever is convenient and what is available and the time slot." From Ned's perspective, there is "that other group"--those who are not technically literate--"if you don't ...make it friendly on their time then they will never want to use it." Being "friendly on their time" included recognizing older adults had interests that limited their desire to spend time at a computer. Learning relentlessly ate the time Kate wanted to spend elsewhere and she came to resent time spent at the computer for minimal results.

Attending an educational institution did not serve the needs or wants of all older adults. Del, for example: "I personally will not push myself to go to these courses." And others (Eva, Sandra, Marge) had no desire. Edgar:

> Nowadays, my wife says we should take a computer course, and I say what for? I'm not interested in it quite frankly. She is but I'm not interested in it. In a sense, I don't want to get into anything where I have to do homework, and all the rest of it. I've done all that. I want to enjoy life and kaphooy on computers, that's it.

Ned wondered whether his wife's recent experience taking a computer course, would be her last. "It was pumped too fast. (Students) just couldn't keep up."

> Now it's just a matter of can I get her back on (the computer) because I wished I had never taken her on that other course. It scared her. ...She was really intimidated by it.

Intimidation took other forms, affecting the desire to even initiate learning. Sandra wanted to take university courses but the thought of the technology, not her ability to manage the course, intimidated her. "I would like to go back to university but you know that's the thing that scares me. Even to go to the library you have to be able to use a computer." Though she thought of a way around her dilemma, she anticipated that that path would soon be barracked. "After awhile they won't have the libraries because everything will be on disk." The anticipation of confronting the long arm of technology stymied Sandra, a university graduate, from engaging in further formal learning. Earlier, she said of computers, "I just didn't like them. If I could skirt around it, I would walk around the long way." Technology had become a barrier to achieving what she wanted; avoiding technology would not likely be a sustaining, long-term coping strategy.

The social environment had an impact upon older adult's predisposition to technology. Work and educational institutions provided opportunities to learn computer technologies, but other institutions appeared not to offer learning support, leaving it to individuals to form a learn to use or avoidance strategy. Institutions, including computer manufacturers, appeared to have abrogated community education for older adults, leaving many to learn on their own or avoid technology. Left to their own, some older adults would not learn technology and, as illustrated by Sandra, not learning technology could impede personal fulfillment.

Chapter Summary

The purpose of Chapter 4: Learning Predispositions was to integrate multiple perceptions and experiences of the older adult in relation to computer technology, and to construct a perspective of factors that influence learning. Older adults have developed perceptions toward technology from personal and vicarious experiences. Predispositions were organized in three broad themes: self concept, the family and social environment.

Self concept was considered in terms of self-doubt, control and motivation. Perceptions of the self in relation to technology were not cleanly cut; there appeared to be ambiguity between seeing oneself as a learner and successfully learning. There was a suggestion that years of accomplishments gave them confidence to know they could succeed, yet, when confronted by technology it drew self-denigrating responses of being "stupid" and feeling like a "dummy." If they felt their experiential knowledge was devalued by technology, which was suggested by a changed value structure, it would be evident in their self-admonishments of not being able to understand what seemed so simple for everyone, including children, but not for them.

Issues related to control and adaptation were evident in participants choosing what they wanted to learn not what technology imposed, just as many chose not to be constrained by schedules. The ambiguity of control and adaptation was suggested in wanting to learn but unwilling to ask for help. Further control and adaptation were seen as practical and philosophical. By practical, some felt resigned that they could not do things as they once could, others felt "forced" or "pushed" and for others technology was a means to "enjoying" new things in life. Philosphically, some participants wondered where technology was taking society; even whether aging people had a place there. Other participants felt similarly: "You have to grow with it." Children were an important resource for knowledge, but not necessarily support. Children were perceived as knowledgable but many hesitated to ask them for help. Grandchildren inspired learning.

Older adults unique perspective and relationship with technology may be, as some participants suggested, a historical anomaly that has cut across a broad swath of aging adults, whose experiences and skill with technology range from negligible to vast. The predispositions suggest that participants were very aware of technology, and they were identifying their place within the change, including what they were prepared to do, and what they wanted. Even so, there was a suggestion that if given an opportunity, many would show interest in learning. Insofar as they were participants, might be an indication.

Formal structures for learning were often not desired (i.e., taking a course was unexplored by many), and learning in the public domain (e.g., banks, libraries, stores, telephone technology) was uncertain and insubstantial. Other than educational courses and libraries no other institution was mentioned as a resource to learning. These data suggest that predispositional factors that effect older adult's learning technology are apt to be unique from children and adult learners because of, among others, their prior education, self-concept, work-related learning, family and peer support.

CHAPTER 5: FEATURES OF THE LEARNING PROCESS

Introduction

The purpose of this research was to better understand older adults' initiative-taking and responses to learning computer technology, and the implications to their future attempts at learning. Chapter Four was a discussion of predispositional influences of older adults learning technology. The purpose of Chapter Five is to examine factors affecting the process of learning computer technology as interpreted from participants' perceptions and experiences. A clearer understanding of the issues that aid or inhibit the learning process can be useful for program development and instructional design. It can also assist informal and nonformal resources, including family members, manufacturers, tutors, peers, educators, trainers and co-workers.

Participants were not directly asked about their knowledge of the learning process. In a questionnaire completed at the commencement of data collection they were asked whether they were interested in learning technology. Seventeen of the 27 participants responded affirmatively.

Themes were identified from repetition of key words, phrases and/or ideas generated from the data as discussed in Chapter 3: Methodology. The themes are integrated with extensive anecdotal evidence and research citations. Themes considered are: Speaking the Language; Knowing the Basics, and Accepting the Complexity.

Speaking the Language

For some, language was a barrier to learning that ignited frustration. Not understanding the language used halted older adults in their learning tracks, some before getting started and some as they advanced. This theme, Speaking the Language, explores three perspectives of the influence of language: language as being contextually foreign; learning from text; and the social role of technical language.

Language was a gatekeeper to understanding, communicating and using technology. In the following passage Keith's poignant "but I don't understand the language" epitomized the complexity of understanding and being understood.

> Keith: The trouble is people of our generation; I say to my son tell me how the damn thing works (laughter around the table) and he says, 'Read the booklet' and I say, 'but I don't understand the language'.
> Participants: That's right. Right. Right. (a chorus)
> Keith: If you could understand what this says but it doesn't make a bit of sense. ...I wish I had brought that booklet with me (to show you). You read the thing and it just doesn't make a damn bit of sense. In a sense it is not so complicated, but I can't relate what it says on paper to that darn machine.

Keith expressed a desire and willingness to learn; he was frustrated from the ineffectiveness of his effort; and when he sought assistance from a family member he was greeted by a son who was oblivious to, unempathetic of, or misunderstood his need or desire to learn. Keith was resourceful attempting different methods of learning. Further, he thought he was alone in his ignorance, wanting to show others in the focus group the complexity of the instruction manual: "I wish I had brought that booklet with me." Participants appeared to share his frustration. Being confounded by something he considered to be "not so complicated," may affect learning confidence, magnify his sense of failure, ineptness and doubt about his ability to learn.

Understanding the language--oral, written and symbolic--was fundamental to communicating. In Keith's situation, which was not unlike others, he did not understand the words therefore he did not use the equipment nor could he discuss what the technology could do. Neither could he control the technology nor know how it might be useful to him. The language was not contextually bound to his experience or knowledge. Geoffroy (1994) identified a similar situation, finding that older learners could not imagine potential uses of technology because they were unable to reflect upon it in present context.

Participants spoke of "a completely different language," "I don't understand the language," "they talk a different language," "computer talk" and "we don't even learn that language." Language, used so casually and commonly by one generation was foreign to another, as Peter identified:

> We had most of the family here at Christmas. They were sitting around the table here and each one has almost a different computer, I think. And they are talking computer talk. They could have been speaking Greek. There was no way in goodness I could understand what they were saying.

Peter was symbolically lost in a foreign land of technological babble. Other participants experienced similar "there was no way in goodness I could understand" situations, when reading operating manuals, talking to salespeople, programming VCRs, interacting with family members, and learning to use new technology on their own. Even proficient users spoke of the effort it took to stay abreast of computer terminology (Ned, Gil).

After attending a "get to know your computer" course Jake found: "A lot of the stuff we did it, we applied (the terminology) but the name didn't mean a thing." Technical words often had no analogous symbol in older adults' life experiences nor meaning in their vernacular. The actions, commands and concepts of technical language, replete with codes (such as Alt B, enter, escape, F keys), terminology (such as byte, software, hardware, toolbar, spreadsheet) and symbols (I bars, toolbar buttons, arrows) were not rooted in older adults' knowledge and experience, consequently they had either no or inappropriate referential or symbolic meaning. Learning technology may mean acquiring a new vocabulary set, relearning the meaning of commonly understood words (mouse, apple, port) that have new meaning, and recognizing the inconsistencies in language (Grever, 1986). Research suggests that even a brief introduction to technical language positively effects older learners' attitude to technology (Morris, 1994). In the following, Keith illustrated the change of language and meaning:

> I don't understand the book. I said (to my son) I was raised in the horse and buggy days. If I took you out to the farm and said, 'There's a team of horses put the harness on. You wouldn't know which end to start on.'

Keith's analogy illuminated the change in communication and learning styles, affecting language, meaning and context across generations occurring temporally and contextually--across time and space--between son and father. Keith was working from experience, not a book but from on a farm with agrarian technology. Today he is exposed to technology that has radically changed society's understanding of time and space.

According to Light (1990) language comprehension is affected by memory and age:

> If young and older adults do not share the same system of meanings for words or the same general fund of pragmatic information, comprehension differences would not be surprising (p. 277).

Light adds, that what is not remembered cannot be integrated. When considered in view of learning the language of technology, which for many older adults is new, they are faced with the task of remembering, applying and integrating. Further, age differences in discourse are evident when working memory is taxed from an overload of information, interpreting irrelevant material, and ordering of complex materials (Light).

Computer literate participants spoke reflectively of the language barrier. Gil identified the difficulty of understanding the lexicon and putting words into action:

> The thing is press the escape key. Where is the escape key? Or the control and alt, you see, because you have these keys and those words don't mean anything to anyone. At least the return or enter, they know that you push it in and it does something. But what does escape do? ...And I get into bad (situations). I say type the escape key and they type the word escape rather than hitting the key.

Gil often forgot about the language inconsistencies, assuming learners understood more than they did.

> Even on the computer you have all these symbols. And when I set up a computer for someone now, I put it so there is the symbol and the text. So then they read it and pretty soon they associate with it.

Manufacturers were guilty of ignoring "the basics" (Gil). Oscar expressed similar views of the inconsistencies of technical lexicon with the roots of the problem in industry:

> It's just like some people who are looking for the return key and it doesn't say return it says enter. The computer doesn't have one of those. It's another one of our failings, of the industry; our nomenclature is not consistent.

Research suggests that inconsistencies in information can be problematic for older learners generally and may be exacerbated when learning technology. According to Czaja (1988) language inconsistencies contributes to declines in performance under conditions of uncertainty.

> In general, older people have diminished perceptual flexibility; they are less likely to modify a perception once it has been established. This is relevant to the design of command language and illustrates the importance of consistency of language within software programs (p. 592).

Since new learners have not the referential knowledge to know of or anticipate such inconsistencies their failed attempts might be interpreted as personal failure, at least until they recognize that technology is riddled with inconsistencies. Grever (1986):

> But the tangle of acronyms, slang and technical jargon... has too often made adults feel, unjustifiably, that difficulties in use results from their own failure to understand rather than from the failure of the computer specialists to communicate effectively (p. 19).

From his volunteer work introducing older adults to computers, Oscar noticed that commonly used terminology could derail learners: "I mentioned spreadsheet. Some of them aren't sure what a spreadsheet is. It wasn't part of their lifestyle when they were working." Gil found some learners did not understand they had to enter data and create formulas to produce something on the computer. Oscar found that many older adults were meticulous bookkeepers with records that were spreadsheet-like in appearance but they were unable to conceptualize a computer-generated spreadsheet (Czaja et al., 1989). Similar to this, but in other contexts, older learners have been found to have difficulties making associations between prior knowledge and new learning (Babin, 1988; Carter & Honeywell, 1991; Elias et al., 1987). For example inconsistency between the titles of menu commands and desired action caused confusion (Carter & Honeywell, 1991; Czaja et al., 1989.) Learners responded to instructional techniques such as the use of analogies, verbalization, advanced organizers and methods that helped form associations (Carter & Honeywell, 1991; Czaja et al., 1993; Thompson, 1992). The awe and fear of technology may thrive more in its enigma then its reality, but without the knowledge that language and communication permits many older adults may be at a disadvantage.

With age comes naturally occurring cognitive changes--such as working memory, spatial orientation and processing speed--that can negatively effect comprehension and integration. Because of the abstractness of technical words--their meanings and application--as just discussed, older adults may find integrating the new information difficult and nonsensical, at least initially. Older adults may be more vulnerable to interference from previously acquired knowledge than younger people, affecting their ability to assimilate new information, integrate and recall it (Babin, 1988; Carter & Honeywell, 1991; Light, 1990). Integration of new language with actions may be further exacerbated by what Grever (1986) suggests is the paradox of computer language. "Many of the words are familiar but the meanings are strange; it is often difficult to know whether apparently ordinary words are being used in a highly technical way or not" (p. 18).

Written information, often referred to by participants as manuals, were important to the language drama. Rather than facilitating learning, instruction manuals appeared to be a source of anxiety. Even quotidian household electronics require operating manuals:

> Carly: I go to the manual every time I want to set the clock on my VCR.

And

> Barb: We have a little joke, if we want to record a program phone my daughter-in-law. She comes over and (sets it up).

Written materials not only replace speech but they also alter the medium of communication, making learning a private event. The difficulty of understanding manuals was a refrain heard across focus groups, except for the three participants who had prior experience with computers. They believed they were exceptions among older learners, as Oscar said:

> A lot of people can't learn anything from (manuals). They don't bother me because I've been dealing with them all my life.

Ned, an experienced computer user who wrote manuals for a living, reflected on the paradox of print instructions: "You take the books that come with (computer programs) they are literally impossible to figure out unless you know what's going on." According to Grever (1986) print materials suffer from poor organization, omissions and poor writing, and they "seem invariably to start from the premise that the user wants to know about the machine and programs rather than how to use them."

Written instructions may heightened feelings of ignorance. When Kate could not understand the manual for her antiquated third-hand computer, she never questioned the manual's worthiness (Grever, 1986), but believed it was due to her inadequacies.

> I just want to learn how to type on the keyboard and get some information up on the screen. So I went back to the book and got more out of the book, you know what I mean. I came away and said 'Ohhh'. You know I thought I could at least start, but it went in one ear and out the other.

Though of poor quality, the manual was her only external resource. For some participants text may have stymied their progress and possibly damaged their self-esteem and negated future learning attempts. This is poignant in Keith's: "In a sense it's not so complicated, but I can't relate what is says on paper to that darn machine." The impact upon self-confidence may be considerable. The following are comments of learners' experiences using manuals:

> Barb: I read them but it doesn't work for me. That's my big frustration, it causes me tears.
>
> Ned: They throw this technology out there and they print it, but what does it mean?
>
> Carly: Some of the instructions that they give, they don't print them that carefully or step-by-step.

Learning English as his second language may have been the source of John's difficulty reading manuals. This suggests a problem for older adults who are not fluent in English. Older learners appeared to benefit from streamlined, goal-directed and well-organized text (Carter & Honeywell, 1991; Kelley & Charness, 1995; Zandri & Charness, 1989).

With changing instructional methods (Wolf, 1990) and levels of education increasing generationally (Baker, 1989) older adults may be predisposed to assuming personal responsibility when they cannot understand. They may feel pressure learning a product in a manner with which they are unfamiliar. Participants commented on the higher level of education of youth, who they know to be developing and programming the technology and writing the text information. Implicit to this was a suggestion that these youthful programmers and writers would be accomplished.

The language of technology was integral to learning to operate equipment and it also had a social role. There were personal decisions not to be "pushed" into taking courses as Del, or, as Edgar who would not use technology "until I am forced into it". Barb and Oscar believed it was impossible to avoid technology:

> Barb: When you have a conversation these days it doesn't matter what, but computer comes into it.
>
> Oscar: Every time I saw somebody, why they were just talking computers. I thought no sense fooling around listening to these guys, if I want to keep up with

> them I've got to get into it... Which, I think, if you want to carry on a conversation about something you've got to know something about it.

Oscar felt that it was important to know enough about technology to converse with grandchildren: "...it's nice just to be able to make some kind of comment even about what is going on." Del, and others, relied upon children to translate technological babble:

> When you the average person go in, you, I'm talking about seniors here, and the salesman starts going through all the features. We're not dumb, but really, our old television didn't have those things... But now, I tell you, I buy a lot of televisions directly... but I don't go myself most of the time, I take my youngest son because he understands and I say 'Is that any bloody good to us? Is it any good or else am I paying a lot of money for this?' He says, 'This could be good.' That's the difference, but we as seniors most of us don't understand.

John also had difficulties understanding salespeople:

> At my age, do you understand when you go to the shop, the language they talk those salesmen, we don't understand. That's why you let the children buy the computer.

Carly also felt the ineluctable drag of language when it was not understood. "I took the course so that you would, you know, feel more at ease and know what the salesmen are saying to you." Later, she added:

> ...that's why I took the course, to pick up on the language. You know you have to know the language, and you really do have to find out.
> Barb: You have to know what modem is and you have to know what a floppy is.
> Carly: And you have to know what a ROM is and MegaHrtz.
> Barb: ...Yeah you do, but that's just part of the learning process.

Learning the language was a first step to computer literacy.

This section explored emerging thematic patterns, including the complexity of computer language, learning from text and the social nature of technical language. Technical language appeared not to be concretely bound to older adults' experience and knowledge. The data suggest that addressing language issues will be critical to older adults' engagement in learning technology. For the neophytic learner knowing where to begin to learn technology may be problematic when the language is not clearly understood. The situation could result in a cycle of uncertainty; uncertainty of the reasons why one would learn and uncertainty about how one would begin to learn.

Knowing the Basics

The following text focuses upon the theme of basics, a term used by participants from all data sources. Basics were of two types: one connoted the rudimentaries of mathematics and oral and written language such as that studied in grade school, and the second connoted the beginning phase of learning technology. Participants spoke of lacking the basics or fundamentals of technology. At times, basics were talked about as the "beginning". The textual exploration of basics is approached from two perspectives, basics as values and basics as part of a process.

Basics as Values

Basics as values was identified from the belief in fundamental skills of language and arithmetic, which participants learned in their youth. Some participants perceived that youth today lack basic skills; skills that were fundamental to older adults' understanding of what education was and what it ought to be. Basics were not only perceived to have value they were value-laden.

Prior learning and values are important factors when understanding older adults as learners. Success or failure in prior learning activities can impact upon future attempts and one's self-confidence as a learner (Wolf 1991). As well, prior knowledge can inhibit processing newly acquired information (Babins, 1988; Bolton, 1990; Czaja & Sharit, 1993; Moody, 1986). Accumulated knowledge is an important factor in integrating, inferencing and reasoning of new information (Babin).

According to Sherman (1984) perceptions are inextricable from values, and values are bound to self-concept. There is an "intimate relationship between values and perception" (Sherman, p. 20). Values not only influence older adults' feelings about themselves (Sherman), but value judgments of one's past impact upon coping with life adjustments (Stokes, 1992). In the following, Keith illustrated the basics that older adults learned as children, still remember from rote practice and revere as a possession; something having value to them:

> I'm happy to see the kids progress, too, but the one thing that bothers me and I say to my son: He'll be sitting there and say, 'Oh, the batteries are dead in my computer, I mean calculator. And I say, 'You mean you're going to have to get a pencil and paper to add that up?' He says: 'You do it.' I say: 'What do you think I am?' It's only about three or four numbers and I say: 'It's 487.' I used to be good at that and I could add numbers like that. And often he says, 'Dad, how much is that?' And I say: 'Get your dang computer out, I mean calculator, you depend on it all the time.' And he says, 'It's just as handy.' And I say: 'What if it broke down and you couldn't use a calculator. But I can add that stuff' - so many times. And he says: 'I can't get over how you do it.' And I say: 'It's practice.'
> I was 10 years of age and we had a neighbour and I used to add with him. I would ride the bullwork with him to deliver a load of grain and he would take me in and buy me dinner. He was a great mathematician, a Swiss fellow, and he would make me multiply 3 numbers by 3 numbers in my head. First it was 2 numbers.
> John: Three numbers is hard.
> Keith: I used to add, multiply 3 numbers by 3 numbers and I could add a column 3-wide and 10-high. I could add it. Sometimes it took me all the way to the elevator to figure it out, but I learned how to do it.

The story reifies the pride and meaning Keith placed in mastering and maintaining the basics he grew up learning. These skills were a part of many participants' value system representing hard work and practice, and now perceived unimportant by younger generations. There was a suggestion that children, like Keith's son, might be fascinated by the skills but they placed less value on them than their possessors. In the following, Sandra assesses the relevancy of basics by today's standards:

> Kate: They can read their machine but they can't add 12 and 12 without having a bad time, you know. What do you feel about that?
> Sandra: I don't think they are going to have to worry about it.

Participants spoke with pride of youth's ability to use technology; however, there was concern for the loss of basics. For some, the loss of basics represented an erosion of once-important skills. It indicated a gulf in knowledge across three generations and symbolized a change of defining values. Technology was a crutch in the form of spellcheckers and calculators that made youth dependent:

> Jake: They can't read. They can't even do the basics anymore.
>
> Harv: We have (students) who get summer jobs and they come and say, 'How do you spell that?' 'What do you mean, you're going to the UofA and you don't know how to spell that (word)?' They don't bother (with) that stuff anymore.
>
> Jake: What's the point of taking an exam if you're sitting there with a calculator?
> Gene: That's how they are brought up now. They are not even learning the basics anymore.
>
> Marge: Without a calculator there they should be able to add but the fact is they don't.

Knowledge of basics were a sign of accomplishment, producing good spellers, strong grammarians and the ability to calculate numbers without pen or paper. Participants' perception that "they no longer bother with that stuff" suggested that the standard they valued was no longer useful because it was not being perpetuated. Of his children, Jake said: "They've got a different type of knowledge then what we have but it doesn't say to me that they have better knowledge or more knowledge than we have." Del perceived that because of technology he would unlearn what he spent decades learning to relearn using technology; a time consuming process that he was not so interested in and which he perceived not to be useful.

> I'm not saying (technology) is a bad thing but I think it's going to be harder for people not brought up understanding it. They will only learn from the basics of the things for their life, but it's affecting their life... I think it is interfering with (their) life.

"The basics of the things for their life"--were the accumulated resources drawn from experience and used to make meaning. Further, the change that was "affecting" and "interfering" with their lives, was felt by Del as he learned bank, telephone and domestic technology but felt he would not be "pushed" to take courses or "forced" to learn more.

> It's the same old story, (children) are missing some things you knew how to do. All these things add up. We now use calculators but they don't know the basics and the same thing applies to us seniors who haven't been brought up (with) technology. We missed a lot of (computer) basics and we're not fighting it completely, but it's just... It just makes it a little more difficult to adjust. We just do what we have to these days. ...(Youth) don't care (about the basics), and some of us don't care about the other side of new technology.

In this passage, Del initially suggested a reciprocity between older adults' knowledge and children's knowledge; however, he concluded saying that for older adults it is "a little more difficult to adjust".

Basics as Process

This section, Basics as Process, explores older adults' perceptions of basics as they relate to the idea of beginning. Basics are seen as an elementary stage revealed in participants' perception of learning technology, a felt need for structure and the nature of instruction. Some participants expressed difficulty conceptualizing where learning began. The following passages illustrated the perceived importance of finding a beginning.

> Peter: I don't understand it and I guess I'm just too old to start learning it from the beginning.

> John: If you start with the beginning you know, it's not that hard learning. It's just to get in.
>
> Del: That's why we're finding it hard to get this way now. It's because we were brought up in the old step-by-step with the rotary phones. It's just beyond us to get it because ...we do it a different way. We understand the old way of doing it and when the new stuff comes out we haven't got time for it and we can't comprehend it because we never had the basics. If you have the basics like we're talking about kids, whether it's on television or whatever, they just learn the basics. They don't learn the old stuff like you're talking about the tubes in a television. They understand like these games they have on the computer, they understand that right away. They understand it before their parents do and I'm talking about young parents.

Del, Sandra, Peter, Paddy, Gil and others reflected upon the ease with which children understood technology. Del noted, unlike older adults with years of experience, children did not need to unlearn to relearn. In a prologue to the preceding passage Del reminisced that prior to the growth of technology things were learned once. In the following, Keith was propelled into technology without a full understanding of the process that led him there. He felt he had neither support nor skill to overcome the problem.

> John: The language they are using on the computer is completely different language; it is a computer language. If you start at the beginning then you understand the whole process but when you jump in half way and you don't know the beginning, it doesn't make sense.
> Keith: You're right John. I've had that problem. When I got my computer my son helped me set it up and I should say he (emphasis upon he) set it up and as a result I'm still going back and back trying to find out how he sorts out the information about how this works and what this program will do and that sort of thing. I have this one program that I never use because I still can't figure out what it does. But if you go to someone who has got a machine and they go at in such a way as they gradually build their programs into it they know better what can be done with it.
> John: But that is through experience. You know, you start at the beginning.
> Keith: Exactly.

Keith did not appear to feel in control of his learning. He suggested he would have learned better by gradually building upon his knowledge. This perception is supported by research:

> Evidence suggests that older adults will have difficulty in reasoning primarily when they must both store and manipulate new information, but that reasoning in situations that permit inferences based on previous knowledge remains relatively constant across the adult years (Babins, 1988, p.10).

In familiar situations older adults have a repertoire of schemata that they can comfortably apply, but in unfamiliar contexts their "ready made schemata" no longer applies (Welford, 1985, p. 356). Welford proposed that in unfamiliar learning situations older adults' poor performance may be related to an inability to draw upon an appropriate action because the known no longer fits the situation. Further, in test situations older adults tend not answer when they are uncertain rather to attempt and be wrong, making errors of omission rather than commission (Peterson, 1983).

Relying upon experience, older adults skills may be inadequate for new situations such as learning computers. They may need to recognize assumptions they made of themselves as learners, unlearn some of what has become an accepted way of thinking entrenched by experience, and relearn a new approach with new learning strategies. The process of unlearning and relearning to learn is referred to as habitual processing (Bolton, 1990) or habituation (Moody, 1986). Learning computer technology may require such a change in thinking and practice. For example, Carter & Honeywell (1991) suggest that when training older adults to use computers previous knowledge needs to be linked to present learning while helping learners understand a new way of processing and "indexing" (p. 2) information.

To accommodate these changes educators can slow the pace and present material using a variety of techniques (Moody, 1985; Okun 1977). Research suggests older adults tend to organize information into units for retrieval less frequently and less efficiently than young adults (Craik, 1977, cited in Owens, 1988; Hultsch, 1974). Hultsch found that with even a small amount of practice older adults showed improvement. Pertinent to educators, Hultsch notes that as chronological age increased learning tended to drop off before reimproving, suggesting a susceptibility to learning interference that was not evident with youth. As well, when older adults appear not to be progressing, or even backsliding, it may be typical to the learning process. Older learners appear to have greater success at storage and retrieval if they are taught organizational strategies like mnemonics, pattern recognition, heuristics, mental maps, advanced organizers and other verbal and visual mediators that aid in learning to learn (Babin, 1988; Moody, 1986; Okun, 1977; Peterson, 1983).

From tutoring older adults, Gil, 59, saw the difficulty not only of understanding how keys interacted to produce other symbols and actions but of performing the task.

> Yeah, Control B, it's hard to do the two things kind of together. If they hold the control key down and tap the other, but they hold this down and they have about 57 Bs on the screen. (He laughs). You almost have to teach the keyboard and then the monitor, what's coming on there and what it represents. You have to learn those. And there are so many of those little things that they kind of forget.

Forgetting may be a simplistic response to a more complex problem. Gil recounted how one learner could not understand why he had to input data to create spreadsheets.

> I think when he first started everybody was saying you do something, you push a button and you get the answer. But what he didn't realize is that you have to put the information in to get it out.

Gil found the learner was intimidated by the machine and the process, and would not use it by himself.

> Ned: I think intimidated might be the thing.
> Gil: I would think that. He just can't seem to grasp that... it's a bit more labour intensive than he figured, I think. ...And also you have to do it right. I told him the computer is dumb, you tell it exactly what you want it to do. So he would type in a bunch of stuff and then he would forget to save it. And you couldn't get him to save. You would go, 'Push the alt, file and save' you know.
> Question: It's a different way of thinking, isn't it?
> Gil and Ned: Yeah.

Gil identified a paradox that others had experienced: "you have to do it right ...the computer is dumb". As discussed earlier, individuals said they felt "dumb" and questioned how they could learn if they did not know the basics. Some participants spoke of being afraid to make mistakes and the frustration of making mistakes. Older adults may require a greater sense of security and confidence-building, at least initially (Carter & Honeywell, 1991). Ironically, they are unlikely to get this if they are learning on their own, without support or structure.

> Harv: Really I think on the computer I am working with it all day and saying: 'Yeah, now I'm getting it' and you're happy. Three days later you get back to it and I've lost it.

Older adults have a slower learning pace than youth and generally require more time to complete computer tasks (Czaja & Sharit, 1993; Charness et al, 1992; Charness & Bosman, 1992; Jay, 1989; Sterns, 1986; Zandri & Charness, 1989). Further, many older adults have forgot from lack of use, or have never learned ways of systematically processing information for retrieval (Owens, 1988). With practice they can develop processing skills (Hultsch, 1974). Barb learned she had to write meticulous notes. She wanted to learn an accounting package but she was unable to grasp the process:

> Like if I had written every little move down and followed it through but when it happens, when the instructor is there, it's so natural. It looks so easy that you don't have to write it down. But she's gone and then what you remember of what she told you might just be minus a dot.

That "minus a dot" could be the difference between success or failure. As discussed in the previous chapter, Barb placed the onus of failure upon her inabilities, not considering the culpability of the instructor or computer program. Kate also needed to impose structure:

> Kate: I hope I don't get (an instructor) that says do this and this. I want to know why I press this. Maybe that's my problem. I want to know what the function of this one key is and what it is it actually going to give me. Maybe that's where I'm bogging down.
> Peter: By that time you will have forgotten what you wanted to know.
> Kate: Maybe I have to get it all in unison... I like: number 1 you do this, number 2 will let you do this. Maybe if they put out a book that had it itemized more or less with the next function.
> Eve: They aren't that good, yet.

Participants in another focus group expressed a similar need for detailed structure. As volunteers learning computer program for a seniors' organization they insisted that their manuals be rewritten to follow stepwise. The structure appeared to give them confidence.

> Rita: You know, (I was) just absolutely frightened. So I thought I'm going to try at least but I was afraid of it. I really was and it's so simple, but it takes a little while I think for you to think, 'Yeah I can do this'. And I'm happy with it now. I think it's wonderful.
> Question: What was the fear? What do you think the fear was?
> Martha: That you would mess everything up.
> Rita: Well having had a few experiences at the library I thought what am I going to be able to do with this. And at first, we didn't have instructions written out as well as we have them now.
> Group: Yeah, yes.

Later in the discussion:

> Question: ..and (the instruction manual) was well written?
> Rita: Not to begin with it wasn't but it is now.
> Harriet: Yeah.

> Paddy: It's perfect now.
> Question: So it had to kind of go through a process?
> Group: Yes.
> Rita: Somebody had to have the time to make it up. And it changed quite a bit too just as we've gotten into the computer. Hasn't it?

Because the participants were not using the computer regularly they relied upon the manual for a resource.

A need for structure in the learning process was identified in research. This included limiting the amount of new material and the speed of its delivery, not to overwhelm and tax memory (Czaja et al., 1986). In learning computers, older learners appeared to benefit from extensive hands-on exploration with practice making and correcting mistakes (Carter & Honeywell, 1991; Kelley & Charness, 1995; McNeely, 1991). A criticism of computer-aided training was that learners could not apply the design's step-by-step process to real-life situations (Czaja et al., 1986; Kelley & Charness, 1995). McNeely (1991) found on-line training effective with older adults because of the structure and self-pacing.

> The main challenge in designing an active training program for older learners is to provide enough structure that the trainee is not completely lost, while allowing him or her to engage in as much active exploration as possible (Kelley & Charness, 1995).

Research on training and instructional designs (Carter & Honeywell, 1991; Czaja et al., 1986; Gist et al., 1988; McNeely, 1991) does not conclude that one technique is more effective than another (Charness et al., 1992; Gist et al., 1988).

The perceptions of participants gathered in this research data suggest that the nature and speed of instruction, at least, at the primary stage of learning was critical. This is supported in research by Czaja et al., 1993; Elias et al., 1987; Jay, 1989; Morris, 1994.

As an experienced user, Gil believed that manufacturers and instructors, himself included, made assumptions about the extent of learners' knowledge: "They are assuming that you know the basics before you walk in, rather than being the first time." Gil continued:

> This is where I have a problem, even with my little tutoring because when I know a program fairly well I forget to go back, (I forget) that they haven't seen it and you kind of think well just push the button ...Well they don't know where the buttons are on the button bar, you see, but I know it and just go push it. Well, they don't know what that button looks like. And where is the button bar? You know, you say, well go to the button bar and push. Where's the button bar?

Ned's wife enrolled in a beginner computer course that ranged from neophytes who did not know how to turn on a computer to the experienced. Her introduction was defeating:

> Anybody that has experience with a computer at all should not be there because they start driving the class too fast. ...the instructor then gets going too fast and the others then just figure well 'I'm just dumb'. You see, this is basically a little bit what happened to my wife.

Further, Oscar mimicked a computer facilitator he watched teaching older adults:

> The instructor will have his finger on the mouse and he'll go down, blib, blib, blib all the way down to the bottom and I can see people like this: Ahhhh! (He grimaced). Some people can't even find the arrow. Maybe it's off the screen. I don't know where it went to.

Oscar advocated learning technology with a partner as moral and technical support, building on one anothers' knowledge from errors and successes (Carter & Honeywell, 1991; Danowski & Sacks; Eilers, 1989). Oscar: "Two people can do a lot more than one person. And if you make a mistake you got somebody who consoles you or somebody who knows if you make a mistake and how to correct it." He continued:

> People have to do it. That's I think the first step. There's another person out here that doesn't do it. Now if that person got together with these people they might do it. They might not, but they might. And I think that's the problem they are a little bit out in left field. (He continued:) That's one reason we started this buddy system, you know, so that people would have somebody, some person that they

> could send an email to and chat to, chat with. And that seems to have helped a lot of people. There's a lot of people who just don't have (anyone).

Like Gil and Oscar, Kate saw a social nature to computers: "They don't have to isolate us, they can socialize us; eventually they can." Some research supports the socializing outcome of technology as a communication device and in group interaction, enhancing social interaction, problem-solving and support networks (Czaja et al., 1993; Danowski & Sacks, 1980; Eilers, 1989; Manheimer et al., 1995; Zandri & Charness, 1989).

Gil's willingness to assist others was grounded in his belief that learning technology required:

> support and talking, and it's probably your circle of friends. Like I have people come over and they come into my computer room and they are all fascinated. I hook onto the Internet and (say) 'Where do you want to go?' you know, and away we go, and (they) see the things I can do. And they get to thinking. And that's the way they maybe (he emphasizes maybe) would (learn).

Support appeared to play an important role in older adult initiation and on-going activity with technology. Finding support amongst cohort relations, as mentors, tutors, siblings and friends appeared to be an effective means of reaching people who may not try to learn without the knowledge of having accessible, reliable support. This cohort may be affected by common life events, experiences and similar levels and styles of education that form a natural support network.

This subtheme, Knowing the Basics, considered basics as a value, and as a process of learning. First encounters with technology need to be sensitive to older adults' notion of the basics. They may be learning the basics of technology with the basics of reading, writing and arithmetic in their minds. These basics represent a body of knowledge that they know well and of which they appear proud. It will be the challenge of educators to help build the bridge from abstract concepts to concrete thinking. First impressions of learning are critical to attitudes, and attitudes may impact upon continued learning (Czaja et al., 1986; Morris, 1991). As expressed in their stories, first impressions of technology may be influential because older adults are, for the most part, learning of their own volition and directedness. This section's exploration of basics may be useful to development of instructional design, taking into consideration an understanding of the influence of previous knowledge and held values, and the impact of basics upon process comprehension, structure, instruction and the potential for social learning.

Educators may be challenged by the apparent need to develop methods and techniques that incorporate prior knowledge--the basics--into learning computer technology. Kelley & Charness (1995) suggest that computer programs have neither been tailored to older adults' interests nor have programmers considered how they learn when developing software or hardware. Further, changes that benefit older learners are likely to benefit all users (Czaja et al., 1989; Kelley & Charness, 1995; Manheimer et al., 1995).

Accepting the Complexity

In this section, acceptance is not a value judgment advocating technology over other ways or means, but as an understanding that technology is complex, not readily understood and that to learn to use it one must allow for and acknowledge unknowns. Accepting that one cannot completely understand technology may be critical to learning; it may also be a difficult stage of understanding to reach. This section discussed the theme of understanding from two perspectives: accepting the unknowns of technology in order to learn; and acknowledging oneself as a learner.

Ten years ago, at age 56, Barb took a computer course--an experience she called "traumatic". Today, the computer has "opened doors of opportunity" for writing, doing accounts and undertaking creative volunteer and family projects. Barb cannot set a VCR and will not use a bank machine. She took private lessons to learn an accounting package which she admitted she "could not master". She marveled at her 4-year-old grand-daughter's lack of inhibitions on the computer. In the following passage she described how she learned to accept technology. She contrasted the natural process of a garden, something she understood from experience, with the processes of technology--something she could not understand but learned to accept.

> See ordinary things like planting a garden or shoveling or doing something like that is that you can see the whole mechanical process whether you call it technical or mechanical I don't care. But you can follow it at each process because you know if you do this, this will result. But in the technical world, the computer world, you push some buttons and you have no idea what makes it work. And it always comes back that you don't know why but it does and that is the intimidating part. That is the thing that I think we have to teach ourselves not to worry about. We have to make ourselves naturally aware.

Barb juxtaposed the natural and understood progression of "ordinary things like planting a garden" with the plastic world of function keys where unknown things happen and "you don't know why." She offset concrete knowledge of the garden with the abstractness and uncertainties of the computer. Making "ourselves naturally aware" of computers came with experience, accepting that "you have no idea what makes it work," and by teaching "ourselves not to worry". Developing the confidence to accept that technology is riddled with unknowns; unknowns that children accept naturally. Unknowns upon which educators can create structured and safe learning environments. Barb accepted the process although it did not always make sense:

> You know K is thousand. That's 640 thousand digits or something of memory. I don't know what the measurement is but we don't need to know, that's what we are constantly being told. It just works that way, we don't need to know. It's like: Do we need to know how a carburetor works to start our car?

Reaching a stage of acceptance required time, practice and the opportunity to question:

> I wanted to know why it did this and how did it work. And now I've been able to sort of gloss over it, put it in the back of my mind and not worry about how it works because who knows actually how this works. Things work.
> When you get one of these boards out of the back of the computer... you just say, 'Ah, what does it all mean and who put it together and how did they know how to put it together? ...And if you bring one of those (directories) up it just amazes, squigglely jiggly numbers and letters and little asterisks and little commas. It isn't anything real, but that is the program.
> Carly: Oh, yes, yes.
> Barb: But it absolutely doesn't mean anything, and then the questions start bouncing through your head. Who put this together? How do they know? And why does it come up like this? But there is never an answer.

In knowing that it "absolutely doesn't mean anything" Barb appeared to gain control of technology which she was investing time, energy and trust. There appeared to be a translucent and immutable barrier between learning technology and understanding how it works. If Barb is typical then learning technology may be more than a process of learning how to make it work; it may also involve accepting that it works.

Older adults may not want or need detailed knowledge of the mechanics of technology; however, a cursory understanding may be a helpful means of concretizing what seems to be enshrouded in mystery. It may mean seeing, touching and talking about the mechanics of technology (Crawford, 1996), reducing fear of losing control or breaking it (Elias et al., 1987) and providing the opportunity to make mistakes in a safe environment (Carter & Honeywell, 1991).

Older adults may not want to be excluded from using technology so much as they are uncertain about learning. According to Carter & Honeywell (1991) "resistance to learning is much higher than resistance to using" (p.3) or no one would try. Gil experienced this with a man he tutored. The man bought new equipment but would not use it unless Gil was there. Progress was slow:

> He wouldn't try things on his own. Either I would be there or I would be on the phone (with him). He's getting a little bit better but, ahh, it's still going to take awhile. He faxes by himself from it now. But he knows that he should know it to keep up with technology but he just doesn't want to put the time in on his own. You know, to putts around with it everyday.

Technology's oracular presence may appear unforgiving. From Carly's perspective, watching young children play on the computer: "makes you realize that you can do a lot of things on the computer, like experiment and you're not going to wreck it". Gil had to learn that he would not break the machine; how it was necessary to make mistakes, shut off the machine and reboot. "Don't be afraid to make a mistake. That's the thing, you know. You are not going to hurt the thing. And the kids have no fear." At times, there appeared a perceptual discrepancy between learners' view of making mistakes as evidence of not learning, and researchers and trainers seeing mistakes as a means to learning.

It is reasonable to expect that a cohort, born or raised in Depression years and unfamiliar with technology will have views unique from younger cohorts (Peterson, 1983) including not trusting its money with a machine (James, 1993). Discussion of bank machines was prefaced by concerns of lack of privacy (Sandra), lack of standardization (Martha, Gil), no perceived long-term value of learning (Ella, Peter, Gene), and personal safety (Rita, Kate). These issues would impact upon learning and use. Some reflected upon the simplicity of banking technology once learning was achieved.

> Harv: You must say they are simple. In my mind they are simple.
>
> Gene: The average person can do that even a dummy like me can go in and do that.
>
> Carly: (of a bank machine) It is quite simple in a way.

Of computers:

> Keith: (computers) It's not so complicated but I couldn't relate.
>
> Rita: It's so simple but it takes a little while I think for you to think 'Yeah I can do this.'
>
> John: When I got the camcorder I was completely lost. You know, like they say I asked my children how to use it and 'Oh, the book is right there'. Then finally I learned by myself and it is very simple. It was simple, yes, if you got into it. I just sat there and made a mistake and retried again. Finally, it wasn't very hard.

Prior to it being "so simple" Rita's unsuccessful experiences using computer made her "absolutely frightened." When Oscar tutored older adults a typical first reaction response was: "Well I didn't realize it was so simple." With instruction, Martha felt she could learn to use the computer "if someone would show me where its brains are." These examples suggest that while self-doubt was prevalent, confidence and desire to learn were also apparent.

Keith, Barb and Kate believed they had the ability to learn but became encumbered by barriers. For Barb the barrier to learning bank machines was "psychological" but once learned "It was so simple." For Keith it was understanding and interpreting the technical language: "In a sense it is not complicated, but I can't relate what it says on paper to that darn machine." Kate, who encountered numerous technical barriers as well as lacking resources, said she approached learning the computer with "determination". Even with the confounding of technology with cognitive and physiological changes--which many perceived to be occurring--participants acknowledged their ability to learn, even if they chose not to learn. None of the participants said they could not learn. Some participants may have been inhibited to openly discuss their fears or lack of confidence.

Accepting and understanding physical and cognitive changes that may impact upon learning may be important to both the learner and the educator. Participants perceived their memory to be on the decline (Ella, Keith, Harv, John, Kate, Barb, Paddy, Harriet); not an uncommon perception (Babin, 1988; Eilers, 1989) though not necessarily founded. They perceived that they did not have the ability to learn as they once did (Del, Kate, Keith, Barb); and that they learned more slowly (Peter, Del, Kate). Of their physical changes they spoke of declining vision, and the use of bifocals that made looking at terminals uncomfortable and programming equipment with tiny buttons awkward (Sandra, Barb, Oscar). Research bears out their perceptions (Czaja, 1988; Schaie & Willis, 1991). Participants did not mention, even in passing, any effects of physical changes on learning technology although literature shows a chronic condition such as arthritis can prohibit clicking a mouse, and fatigue or remaining stationery over periods of time can be limitations to learning (Peterson, 1983).

This section discussed the theme of understanding from two perspectives: accepting the unknowns of technology and acknowledging oneself as a learner. These two perspectives have a mutual relationship. Older adults recognized the complexity of technology; they also recognized that they could learn to use it.

Acceptance was not a value judgment. It was a means to accepting technology as a "tool" (Barb, Gil, Ned) from which one could objectively and critically reason about technology. The data suggested that non acceptance may be evident from self-denigrating comments, and assuming personal fault for not understanding rather than attributing blame to poorly designed technology, poor instruction or information. It means believing as Gil iterated: "the computer is dumb." Educators may need to address this issue verbally and practically through constant positive feedback, and by helping learners to think critically about technology.

Chapter Summary

Chapter 5 explored understanding the inconsistency and unnaturalness of language used in technology, basics and accepting the complexities of computer technology as a step to learning. Understanding language was critical to communication and learning. The participants' perceptions and experiences suggest the complexity of computer language can deter older adults from learning. Technical language may act as a barrier to learning, being abstract and baseless lexicon that has no concrete form in older learners knowledge or experience. The data also suggest that older adults' views of the efficacy, purpose and value of technology may impact upon the amount of time they are willing to spend learning. Further, they may not initially have a means to determine value or purpose if they have no basis to knowing technology's potential use. Whatismore purpose and value are subjective and may be, in part, a response to historical influences attributed to cohort experiences as seen with bank machines.

The data suggested that advanced users saw the transferable nature of skills from one form of technology to another. Further exploration of the nature of transferable skills and techniques to assist older learners in making connections between different forms of technology may be useful in developing self-confidence, and sustaining use and interest.

The data suggested that older adults can learn, perhaps more easily than they anticipate; however negative perceptions may become personal barriers. In a society that has not valued older adult learning, greater onus may be required of educators, planners, and family members to better understand the influences and factors involved in older adult learning.

CHAPTER 6: SYNTHESIS AND IMPLICATIONS

Introduction

The purpose of this research was to better understand, by exploration of perceptions and experiences, older adults' initiative-taking and responses to learning computer technology, with consideration of implications to their future attempts at learning. Two over arching categories--learning predisposition and features of the learning process--guided the organization and thematic analysis of the data.

In Chapter 4: Learning Predisposition the impact of learning technology was identified and discussed thematically as: Self Concept; Family Interaction, and Social Function. Chapter 5: Features of the Learning Process focused upon the actions that older adults undertook and process-related barriers they encountered learning computer technology from three themes: Speaking the Language; Knowing the Basics, and Accepting the Complexity. This exploratory research is foundational for future research. Practically it may be a resource for needs assessment for program planning.

Together, the predispositional and processional influences offer a broad perspective of the older learner. When coalesced and analyzed these data revealed a third category--a learner typology. That is, what it is to be an older adult taking the step to learn not once but many times across many abyss of uncertainty, carrying the baggage of past learning experiences into a new age of learning. The typology attempts to define attributes of the older adult learning to use technology, considering what may be understood about them from predispositional influences and interaction in the learning process. With further development the typology may be a guide to assess and tailor learner needs to instructional practices. The typology draws upon themes from the data, including initiative taking and support.

Initiative was both the decision an older adult made to engage in learning and to enter the learning process. Because learning technology requires repetition and a context in which to learn--the decision to undertake learning may be expected to have been considered prior to engagement. Without the external influence of work, taking the initiative required self-direction and assuming responsibility for one's learning. In taking initiative, support appeared critical for success.

The following text is a synthesis of the findings introduced and contextually analyzed in Chapters 4 and 5 framed by the concept of learning to learn. This is followed by a proposed learner typology. The typology begins with a brief description of initiative and support, influences drawn from Chapters 4 and 5, followed by an elaboration of the five proposed types: 1) explorer 2) visioner 3) proactive learner 4) reactive adapter 5) reluctant adapter. The penultimate section contains recommendations of interest to family members, program planners and educators. The chapter concludes with ideas and methodological considerations for future research.

Findings from this study are not generalizable to the population of older adults because of the participant numbers, the nature of participant selection and methodology. Older adults who had experiences using technology were invited to participate. Older adults without interest in, or experiences with technology were perceived to be unable to adequately explore learning. The near exclusion of this group impacts upon making broad generalizations.

Learning Predispositions and Features of the Learning Process: A Synthesis

Problems and issues related to older adults, technology and learning are as diverse as the individuals involved, the technology used and the opportunities to learn. But they do conflate. Understanding this relationship will be more important as the population ages and as the thrusters of technology continue to be primed for full speed. To adapt suggests that older adults must take the initiative to learn, and that society must make greater effort to support their learning. Older adults appear to have unique learning characteristics, they have experienced technology differently from other cohorts, they have fewer learning opportunities, there are greater obstacles placed in their path including minimal computer experience, doubts about need and desire to learn, issues of efficacy and trust, and the effect of an anachronistic education. A concept such as learning to learn may be useful to address the unique nature and circumstances of older learners.

The combination of an aging cohort with modest computer skills, the proliferation of technology and a heightened awareness of maintaining physical and intellectual independence makes the context ripe for a conceptualization of older learners within a learning to learn framework. Sometimes discussed in context of lifelong learning (Candy, 1990; Smith, 1990) or self-directed learning (Tough, 1990), learning to learn is not often talked about in relation to older adults. But when studying the perceptions and experiences of older adults learning to use technology, the concept, though not discretely defined, appears compatible as a goal and a process (Smith, 1990). Older adults will need to be self-initiating, finding opportunities to learn and resources to support learning.

Amorphous like, learning to learn eludes concrete definition. Candy suggested there was "no wholly satisfactory definition of learning to learn, certainly none that is widely agreed to" (1990, p. 33). The process of learning to learn involves: becoming an active learner, taking control of learning-related activity; broadening one's repertoire of learning strategies; adjusting to different delivery systems, methods and subject areas; enhancing learning confidence and motivation; and developing strategies to compensate for metacognitive deficiencies (Smith, 1990). In this last instance, Smith (1990) cites as an example improving adolescents' ability to think conceptually and analytically. A similar situation may apply to older adults learning technology. Teaching older adults coping and compensatory strategies such as anxiety-reduction, memory-training skills and learning techniques may be useful for learning computers, giving learners greater control of their learning (Carter & Honeywell, 1991; Czaja & Sharit, 1993; Owen, 1988).

Older adults are learners (Peterson, 1983; Seniors Directorate, 1992). However, the complexity and pervasiveness of technology may require a new way of looking at the older learner. Peterson suggests courses in learning to learn "are among those that contribute to growth and integration" of older learners (p. 10). As elusive as learning to learn is, it offers a framework to embrace aging, learning and technology. The following discussion is a recapitulation of the research findings from a learning to learn perspective beginning with Paddy's reflections on being a learner. She was 84-years-old.

> As far as the computer was concerned forget it, (my husband) wouldn't touch it nor would he touch the wordprocessor. He wouldn't even use my electric typewriter. On the other hand, all right, I had to educate myself and I've always

> been (learning). I used to work with machinery when I was on the farm and I've worked with everything. I've taught myself to do plumbing and wiring and everything else. So I've been used to going ahead with something that way, but him, he didn't want to be bothered.

Paddy was confident of her ability to learn. She was conscious of herself as a learner, assessing and responding to challenges and interests. She engaged in learning deliberately and visualized herself as a learner. For example, though a fledgling computer user with a Grade 9 education, Paddy was disappointed that her son bought her a wordprocessor when she was prepared to learn to communicate with family by computer modem.

Barb was reflective of her learning. A computer user now, Barb had to overcome a high hurdle of doubts about her learning abilities that persisted from negative high school experiences. Those impressionable early years of education were indelible:

> If you compare today with school days, yes, the way I learn now is much different because I am learning now because it is (for) me. I knowingly acknowledge that I want to learn and that it is a part of my life, a part of my goals, but I think when I was in school it was just expected that you went to school. ...now I am learning things and marveling... It is different when you get older or something and you don't have to learn specifically, learning becomes so beautiful. And that's neat.

The baggage carried from formative school into adult learning can be immeasurable. Even after some success learning the computer, Barb still peppered comments about her ability to learn with shakes of self-doubt and derision. But she did come to see herself as a learner. She spoke about her need to understand first how technology worked and then to accept that she would not understand.

> I wanted to know why it did this and how did it work, and now I've been able to sort of, sort of gloss over it, put it in the back of my mind and not worry about how it works because who knows actually how this works. Things work.

She questioned why she could not grasp technology and was exasperated that she had to write notes, being unable to see the process as her husband and daughter did.

Her reflectiveness is not unlike what occurs in the developmental process of learning to learn (Candy, 1990) in which people consciously analyze and review the process and outcomes of their learning. Barb was dogmatic about learning, and tenacity and perseverance may have been her best allies. She was unable to conceptualize technology, but she accepted it would work, sought support from resources including family members, educational institutions and tutors. Further, she was attentive to her learning style, recognizing her need for experiential learning because manuals "bring me to tears." Barb's initiatives, not unlike Smith's (1990) assertion that in learning to learn one adapts learning to be effective in various contexts and settings. Gooler (1990):

> ...learning to learn implies not only that individuals gain certain skills but also that they develop attitudes or proclivities toward learning, and toward their own capacities to learn (p. 21).

Being on the periphery of technology, older adults may be vulnerable to technological changes, including personal and structural barriers such as illustrated from the data. These include feelings of self-doubt, lack of control, lack of perceived purpose, lack of moral and technical support, and process related barriers, including language and the structure and style of learning. Developing confidence to undertake learning initiatives is integral to learning to learn (Smith, 1990).

As families become more geographically scattered, typical to Rita and Paddy's situations, older adults may find it necessary not to rely upon family members as a resource for learning. Regardless of location, the data suggested that assuming the family would be willing, able and available to assist might be short-sighted. This may require greater self-directedness seeking out and contacting resources beyond the family.

Learning to learn may be a useful strategy for helping to maintain independence. Older adults risk becoming separated from sources of knowledge critical to well-being when they cannot access information using technology, e.g., voice mail, electronic banking, library terminals. The data would suggest this is not uncommon.

Independent living, as a precondition to quality of life (McPherson, 1990) may be enhanced by technologies (Chappell, 1993). Czaja et al. (1993) found that with some design modifications and access to technical support, electronic mail had potential and appeal as a communications tool for older adults. Electronic mail, they suggested, might be particularly beneficial for socialization of older independent-living women. According to Chappell (1993) as need for technology increases with age, the ability to use technology appears to decrease. This begs the question: When is the right time to learn?

Like some other participants, Peter believed he could learn what he was interested in but it was unlikely to be technology. Peter's aversion to learning technology may be, in part, an inability to see a purpose or need to learn. It may be more fundamental: how does he go about learning? Where does he begin? Is he well informed to critically evaluate decisions? Writing about learning to learn, Gooler's (1990) comments may be viewed in context of older adults' lack of knowledge and technological marginalization:

> To the extent that information is power in future societies, having access to information is likely to be a significant determiner of one's ability to obtain personal and social benefits (p. 317).

Dick, a focus group participant, echoes Gooler; knowledge gives him independence:

> It seems to me that if my independence is based upon knowing things and that the ability to find out things is a lot quicker today than it used to be. It's a lot easier....There's a helluva lot of knowledge out there and I can access it. So I have more independence today than I would have had earlier, I think.

Learning to learn is salient and applicable to the study of older adults. By including technology the utility of the concept is heightened. Consider, for example, the strong visual orientation of technology and the potential impact upon older learners. If older adults are more reliant upon an instructional style that taught them "the basics" and not the process-sequencing steps used in computer technology, they may need to learn a new way of learning. Older adults may need to become more self reflective of their learning. Educators may need to help facilitate and integrate this process. According to Gooler (1990) learners must step back from the technology and reason through the learning process.

Some participants in this study said they would adapt as they needed to and no more. For technology to be meaningful in a community it must be inclusive and it is not. Older adults require support learning technology and assistance understanding how it can fit into their lives now and in the future. From an informed perspective they decide the use and value of technology. They then control how and when they choose to adapt. Older adults should not be expected to accept technology without question, but they should be prepared to take control of their learning. By developing a learning posture older adults become active participants in their life course, they can then decide whether and how to act upon technology rather than being acted upon by technology's influence. Eilers (1989) suggests this is the difference between a "passive recipient" and an "active agent."

While older adults appeared to believe that they were capable learners, some were stymied by self doubts and feelings of loss of control. They appeared to experience difficulties comprehending the language used to describe technology and its processes. That participants appeared to conceptualize that learning the "basics" began at a knowable place, suggested that learning technology might be interpreted as a linear process. This might be seen in participants' description of the "natural" inclination children have to technology, while they struggled with the language, the process, and the value of technology. Further, that participants spoke of the general imposition of technology in their lives and the frustration evoked trying to learn may be greatly appreciated when even defining technology is not an easy task (Daamen et al., 1990; Misa, 1992).

The following section is a reconceptualization of the data from Chapters 4 and 5, forming a typology of the older adult learning to use information technology. The text begins with a brief introduction of the typology followed by a discussion of the two criteria, initiative and support, that frame the typology. The typology is recapitulated with a description and explication of the learner types using examples from the data. The chapter concludes with a section on educational implications and future research.

Learner Typology

The proposed typology of older learners is a synthesis of research literature and the study data developed on the premise of the individual taking the initiative to learn, and the need for support in the learning process. The purpose of the typology is to gain better insight into the older learner and to develop systematic means of supporting the unique learning needs of the identified types. The types are described discretely but in reality they are fluid, reflecting the complexity of the learner. The types are contiguously linked from those who have integrated technology into their lives to those resistant to learning.

Geoffroy (1994) found that not understanding technological language made it difficult for older adults to talk meaningfully about technology. With greater exposure to technical language and opportunities for practical experience, older adults may be able to make informed decisions about personal value and meaningfulness of technology, recognizing its shortcomings and potential uses. An outcome may be greater self-directedness in their learning initiatives and a better understanding of appropriate learning resources. The following text briefly describes initiative and support in context of predispositional and processional influences on older adult learning. This is succeeded by a discussion of the learner typology.

Initiative

Funk & Wagnalls (1989) defines initiative as: "the power or right to take the first step or the next step in some action: to have the initiative." Initiative is also defined as: "the action of commencing or originating: to take the initiative." In the first definition one possesses initiative; one has initiative. In the second definition the initiative is active, one takes initiative. This research interprets initiative according to the second definition as an action that is taken.

Taking the initiative to learn is affected by predispositions of oneself as a learner, including acceptance of stereotypes, past educational experiences and support. For older adults, the purpose of learning technologies and the reasons for not learning may be quite different from other segments of the population. For example, it cannot be assumed a retiree would learn a database program for the same purposes as a youth or an adult engaged in professional development. The following exchange suggests that learning technology may be unique to lifestage:

> Hal: It's tougher for the younger generation than the older.
> Question: Do you think so? In what sense?
> Hal: Well, what is society out there? There is no work without computers.
> Jake: You have to keep up so you don't fall behind because your job is dependent upon you knowing. There is no pressure on us to know the latest technology. If we want to embrace the latest technology that is our choice. It is not a demand. We are not forced into it.

Some participants learned technology at or because of work. Some participants also felt they had options apart from technology. However, possessing technical skills will become more important for older adults as technology becomes common place (Kelley & Charness, 1995).

Without employment as a motivate to learn, for older adults the initiative to learn will be self directed. How can educators understand the initiative that drives older adults to learn something so complex it is perceived to have its own language; it does not have a foundation of "basics" that are valued and commonly understood, and has a process and structure unique to anything they have learned? How can educators better understand initiative taking and, in doing so, assist others?

Peterson (1983) wrote of the difficulty ascribing motive to older adults actions because they were renown for indicating interest in activities but not participating once activities were organized. Taking the initiative includes, and moves beyond, motivation to action. An illustrative example from the data was of participants like Peter, Gene or Kate who said they were motivated to study computers, knew where learning opportunities were available but never took the initiative to enrol. External factors influence learning. For example, in childhood, formal education helps prepare for employment and in adulthood learning technology may be a condition of employment or advancement. What will be the factors influencing initiative-taking and the self directedness necessary to learn technology in the third age? Answers, though elusive, suggest that motivation to learn may be for personal control, satisfaction, independence, stimulation and social interaction. Perhaps at no other time is it so important for older adults to continue to learn and for educators to study older adults. The data suggest that support, moral and technical, was corollary to both taking the initiative and to learning.

Support

For older adults, technical and moral support may be critical to initiative taking, and to developing technical skills. In this study voluntarily initiated discussion about learning technology for future use, such as maintaining independence, communication, entertainment or convenience, was minimal except with proficient computers users. Some participants said they would learn when they had to. Some talked about change which forced them to use technology, such as bank machines and voice mail.

The amount, kind and type of support varied contextually and individually. Technical support included a range of needs from understanding language and procedures to troubleshooting problems. Moral support was active or tacit encouragement, answering questions, showing an interest and acknowledging accomplishments. Family members, particularly children were perceived to have knowledge and skills. Adult children were trusted help translating the technical language of salesmen but they were not always helpful at instructing. Further research would be useful to understand adult children's perspective. They may feel they are being helpful, that their knowledge is resented or that their parents do not want their assistance. The dynamics of parent/child relationships will be a factor in learning.

Places and people where support was talked about included peers, tutors, spouses, family members, past co-workers, strangers, print instruction, formal courses, informal training through volunteer organizations, and nonformal learning for example a salesperson explaining how a VCR worked. Some computer literate older adults were informal resources, doing favours on the computer, tutoring and problem solving. Few of the participants appeared to have a coterie of peers to draw upon for support. An exception was a group of seniors who learned a computer program for a seniors' organization with which they were involved. They spoke of how they worked to have the manual rewritten and adapted to their needs. Some had pursued learning other forms of technology. A buddy system was another means of support discussed by participants. Though grandchildren appeared to influence older adults they did not appear to be strong support for learning. Businesses and institutions that use technology (apart from the library) were not mentioned as sources of support, although older adults talked of situations where they purchased technology and encountered automated banking, voice mail and data cards.

In a case study of a computer program at a seniors' centre in California, Eilers (1989) found that newly enrolled students had been encouraged not by youth, but by age-peers to learn computers. Study participants said they made new friends, they were more active with older adults, and there was a spirit of camaraderie, sharing and problem-solving. She described non-learners as "passive recipients" and learners as "active agents" successfully coping with the computer and "adapting its capabilities to their special needs. They are acting to reshape the course of their destinies." The extent to which learning occurs may be related to initial and on-going support.

The following text proposes a typology consisting of five learner types: explorers, visioners, proactive learners, reactive adapters and reluctant adapters. The typology proposes a means of understanding the learner with consideration of the initiative the individual takes to engage in learning and the kind and intensity of support the learner may need to succeedl. Individuals will be influenced by personal learning styles and respond differently to instructional methods. The typology may be an assessment tool for educators, keeping in mind older learners' initial need for individual assistance. The types are not discrete, there is an ebbing and flowing between descriptions.

Explorer

As a learner, the data would suggest the explorer is characteristically self-initiating and self-directing, and to a large extent technically self-supporting. Process oriented, the individual would consider what technology should be able to do and then explore for results. From practice, experience, and with training or a natural proclivity an explorer would integrate technology into his/her life and move about it with ease. In this study, such learners would be Gil, Ned and Oscar. The data suggest they had a broad, reflective perspective of technology and its benefits and limitations. Desire to learn, a willingness to "just grow with it" (Ned) and a predilection to technology may be attributes.

Explorers appeared to view technology as a tool and what they did not understand they learned through investigation or individual learning projects using a variety of resources. Oscar's "I'm just looking at the manual and it tells me what to do" suggests a high level of independence and an ability to conceptualize learning. Technology was part of their lives and to a large extent they would make choices that would involve adapting technology to their needs, whereas other types, particularly the proactive learner and reactive adapter would talk of adapting to technology.

> Ned: I'll never get rid of (the computer) because me, I won't get rid of my telephone either.
> Gil: That's right. Exactly.

From their stories they appeared to have the confidence and ability to transfer learned skills to unfamiliar settings at airports, kiosks, banks and computers. The data suggested that explorers supported others, technically and morally, and spoke with circumspection about the difficulties they saw others experiencing.

> Ned: Yes it's moving very fast. And that's where it's going to make it hard for those who have never used a computer.
> Gil: And that are so intimidated by them that they don't want to try.

They saw the difficulties some older adults had conceptualizing technology. They were not uncritical of technology, recognizing structural and personal barriers that made learning difficult including; the complexity of codes, poor designs, rapid changes, inconsistency of technical nomenclature and inadequate learning opportunities. Because of their skills and knowledge they were sought for help, giving them a role-model status.

> Gil: What do you do with it? How do you explain that? You just use it as an every day tool kind of thing, and so it's not that you're a computer geek. But if they want a phone number they phone me because they know I've got it right away. But it's just that: 'What do you use it for? What would I use it for?' You can't tell them that.

They tutored, volunteered with organizations, and helped neighbors and friends. Their actions appeared generative and altruistic, a result of sharing their talents by giving back to the community. The explorer may be suited to assisting program planners as participants of needs assessments and peer trainers.

Visioner

The data would suggest that visioners were goal-directed learners, wanting or needing to fulfill a desired objective. Their initiative would be purposeful. They would likely anticipate the potential of technology but not have a need or desire to develop the proficiency of the explorer. As an example, along with Barb's successes using technology, she had disappointments: "I just couldn't master it." She struggled to learn a program, did not succeed and went on to other pursuits.

> For as far as I have taken it, for what I enjoy most--the word-processing--and what it can do for me, and my little bit of cards and things I make, I am in control. And I love it. I really appreciate it. I count my blessings because it is a wonderful blessing. I would say I am in control as far as I want to be.

From her experience Barb spoke reflectively about the meaningfulness of learning:

> To me it just broadens your horizon and gives you so much more opportunities. Certainly I think they contribute to quality of life.

Barb and Carly spoke of using technology as a "tool" used "in conjunction" with other interests, keeping them active and involved and thwarting a "mushy head"--Barb's term for the outcome of not being intellectually active. They were purposeful in deciding what they wanted to learn. For example, Carly wanted to do genealogical research and community work on the computer. As a widow, she saw technology as a means to maintaining independence. Barb wanted to be "intellectually in contact":

> What I do is strictly now for my own pleasure, my own entertainment, my keeping up with my children and my grandchildren, so I can be intellectually in contact with them, not just some little old lady that sits in a rocking chair. I don't want to be just rocking away, I want to be going a head and keeping in touch with the people I love and the people around me. And I think the computer and the knowledge to use it, or any of these modern conveniences, these modern technical things keep me in touch with what's going on around me. And at my age, what's going on around me are very close friends and family, I should say family first and then very close friends.

Whereas explorers had already tapped into other uses of computer technology like the Internet, Barb was contemplating the task of learning:

> I will learn it eventually. I will write every little step down. I will have to write it down and I will learn it eventually but it will be slower than most people. I know but I'll get there.

Demonstrating attributes of what may be a visioner type, Barb had an expressed desire to learn. She was premeditated in her learning and experience; interest and a strong support network gave her a broad perspective of technology. She appeared to be a willing learner who had reflected upon her limitations and strengths and though uncertain at times she had gained self-confidence from exposure.

Technical support may be expected to be primarily for initial learning and problem solving. It may involve taking programs at educational facilities and reliance upon family members as Barb's husband helping her solve "glitches" and Carly's daughters were encouraging. Although Carly had some work-related computer experience, taking a course gave her confidence:

> I found it very, very useful because you think you are computer literate until you start hearing about all the different little things you should be watching for. But certainly it makes you feel a lot more confident about going into a shop and not sounding completely like you were an ignorant person.

Barb used a variety of learning methods and resources including; formal courses, hiring a tutor, self-learning and accepting informal support from her daughter and husband.

The visioner would have skills to assist others and might be a role model, not being so far advanced that peers could not relate but perceived as being knowledgeable. Helping others might be an outlet for talent, producing satisfaction and self-confidence.

> Barb: I did the books for the pastoral charge. I put their books on our computer.
> Carly: That would be just wonderful.
> Barb: And it was wonderful. ..and it was very impressive. (She laughs).

Volunteering gave Dick an opportunity to share his talents and to develop new skills:

> Del: We as seniors, most of us don't understand. Dick, who is really into these things, he understands more than we.
> Dick: I'm into it of course. I got into it because of the newsletter using the word processor. I volunteered to get into the Net, and that sort of thing. I just sort of progressed from there. It certainly didn't come to me full blown.

Learning focused upon what individuals could and would do with their skills. None spoke of seeking employment opportunities. Volunteer activities appeared to be an outlet for talent, gaining new skills and self-confidence. Visioners appeared to identify what they wanted to learn, they engaged in learning activities; developed their skills to a level of competency with which they were satisfied and then proceed to other activities.

Proactive Learners

The data suggested that proactive learners would be receptive and interested in learning, taking the initiative to learn before they had to, but knowing they needed to. They would recognize change because they would feel it acting upon them. They would be task-oriented, purposefully deciding what to learn. For example, when her library went on-line Rita, a regular patron, could not access resources. She felt she needed to spend time practicing on the terminal; she also knew she could ask for help. Watching others retrieve information caused her to question her abilities.

> I can go down to somebody down in the information area and I can tell them what I want and they click away and all this stuff comes up magically. Why doesn't it do it for me?

When she had an opportunity to learn a computer program for her senior's organization she reflected upon her fear and frustration with the library terminals. She persisted:

> So I thought I'm going to try at least, but I was afraid of it. I really was. And it's so simple but it takes a little while I think for you to think 'Yeah, I can do this'. And I'm happy with it now. I think it's wonderful.

Proactive learners can be expected to take the initiative to learn but because they may be exposing their ignorance, they may feel vulnerable and overwhelmed. They may become stymied and frustrated by the process more quickly than visioners but, like Rita, they may be more willing to try than reactive adapters. They may be expected to be persistent but that might wane without some success.

> Harv: I am working with (the computer) all day and saying: 'Yeah, now I'm getting it' and you're happy. Three days later you go back to it and I've lost it.

The data suggested that proactive learners would be receptive to learning yet, as Harv typified, grasping the process would require time and extensive hands-on practice. The outcome, not the process may be what is important. In Harv's case, forgetting and not being able to retrace his steps may have been embarrassing and demoralizing. Research suggests that older adults' attitudes to computers appear to be affected by the perceived quality of the learning experience (Czaja et al. 1986; Kerschner & Hart, 1984; Jay, 1989; Jay & Willis, 1992; Zandri & Charness, 1989). Proactive learners may become visioners if their experiences learning technology were positive and the exposure sufficient. Conversely, their initiative could be snuffed from poor experiences. Likewise, reactive adapters may find that with positive initial experiences and new found meaningfulness, perceptions of and attitudes to technology may become more positive.

The data suggested that proactive learners are likely to demonstrate a qualified acceptance of technology. There was a suggestion of wanting to be informed of technology, curiosity to learn, and an assumed ability to learn by their willingness to try. Self-confidence may be fragile. For example, Keith: "In a sense, it is not so complicated but I can't relate what it says on paper to that darn machine," or Kate:

> I want to do it. I want to do it but you never know maybe there is something wrong up there. (She points to her head.) You know what I'm getting at.

Both were attempting to learn independently. Positive and on-going moral and technical support would be critical to development. The opportunity to ask questions may be part of the process of making sense of technology, and of understanding the "basics" and where learning begins, as discussed in Chapter 5.

Instructional manuals may be a form of frustration and the older adult may be sensitive to the technical lexicon of salesclerks and instructors. Critical to the proactive learner is the willingness to try, to set learning goals and to pursue them. To maintain that initiative, on-going support is likely critical. Perhaps more importantly is knowing where to find resources. Without assistance, the obstacles to learning may appear as huge and incomprehensible as the stack of start-up disks Kate needed to boot her obsolete computer. Support may come from peers, formal learning or solicited advice as need arises.

Reactive Adapter

The data would suggest that a reactive adapter would learn what was necessary when it was necessary as one's life was affected. A reactive adapter might have the attributes seen in Del standing his ground against the force of technology:

> I really do believe myself, I personally will not push myself to go to these (computer) courses.

Del acknowledged feeling frustrated: "I think some of us are frustrated that it is pushed on us and we don't want to learn certain things. But we learn what we have to learn in order to get by." He adapted to technology, using bank machines and other basic technology, but he did not want to "push" himself to learn, believing that technology was being "forced" upon people. "We're not fighting it completely." Del's frustration was complex and ambiguous; time and experiences aided in the fomentation.

Reactive adapters, like other older adults, were confronted by the unknown and uncertainty of change. A difference would be seen in their adaptation. The reactive adapter is likely to learn as the need arose, project specific and from necessity. Change would be against one's will and one's better judgment and enthusiasm.

Peter said he was neither interested in nor had a need to learn technology. However, there appeared to be dissonance between his words and actions; he said he was not interested in technology but enjoyed playing games on his grandchildren's computer and was fascinated by his family's computer abilities. He said he did not want to learn but engaged in learning activities and on several occasions he spoke of an interest in taking a computer course. A former school teacher Peter, 69, spoke equivocally about the value of technology, about learning it and about his interest in it. At times his comments were contradictory, saying he saw little value in technology--"a machine won't answer my questions". His initial misgivings of bank technology fell away to its convenience; "...whenever I want, I go to the machine and get money right now." But then he struggled, feeling: "I'd rather go to the clerk and get a hello, and how are you today." He waffled between enjoying the benefits of technology and feeling anxious about its propensity to isolate from social interaction.

Peter spoke of his ability to learn and was keen to continue learning. Encouragement and opportunity to question and experiment with technology may be critical to learning. Peter's wavering between curiosity and necessity, between wanting to learn and not wanting to invest his time is suggestive of the tug of desire and the pull of ambivalence; the weight of doubt and the strength of confidence.

The reactive adapter's relationship with technology was not always expressed negatively. Some, like Ella, were accepting but disinterested in the change. Reactive adapters spoke of having interests apart from technology, whereas visioners saw technology as a "tool" used in conjunction with their activities. On a number of occasions, Del said older adults would adapt the way they wanted to, when they wanted to:

> We adapt to what we need and that's all the average person wants. They don't want the computers and everything else like that. We have our own little things, our gardening, our golfing or holidaying. We don't need the computers to keep us occupied even playing the games on them.

He said he learned what he thought was useful to him. Purposefulness in the outcome of learning may be very critical to reactive adapters because they may be reluctant to stretch themselves to learn whereas an explorer or visioner might find purpose in the technology itself. The following are responses which could be thought of as reactive:

> Ella: Like Rita says, I'd rather go to the bank. I have the time to do that so rather than getting into this thing, I really don't need it. I have time, I have a car and I can go to the bank, so you know I don't need that. But I guess if I couldn't go then would be the time. This would be a good idea.
>
> Harv: Why worry, you know, unless you're going to need it. Like Peter says maybe the time is going to come you know when he can't go out and do whatever he wants and he's going to have to use one of those machines or whatever, and he has to learn it. I'll be the same way, why bother learning, am I going to need it or use it?

Reactive adapters require support as the need arises and that may occur as with Peter, Ella and Harv, when the old way is no longer available. The data would suggest reactive adapters have difficulty knowing where to turn for help and they might find the process of initiating learning frustrating. The data are suggestive that they may be moderately curious but aloof. Their learning may be matter of fact; just the essentials. Reactive adapters may be reluctant to ask for support because they resent being forced to learn; not that they cannot learn. Ability to learn may not be a factor as much as attitude and perceived value of the technology. The technology will have to have apparent value which may not be readily identified (Geoffroy, 1994). Reactive adapters may need convincing of technology's worthiness; like Peter, while he uses his bank card he remains skeptical.

Reluctant Adapter

This research sought potential participants who had an interest in technology and were willing to share their perceptions and experiences. Nonetheless, some participants with no interest in learning did participate in the focus groups. Their perceptions added a unique perspective to the data, permitting insight into the reluctant adapter. The reluctant adapter had no desire to learn to use technology. Avoiding technology would be optimal and learning would be from necessity.

Participants spoke of their concern about the implications of the speed of change. Eva was particularly concerned about the breadth and speed of change which opened a "gap" between those who had access to information and those who did not.

> Eva: I know what my mental block is and I've said this a long time ago. When I see a computer I see five men unemployed.
> Kate: That's true you know. We talked about that.
> Eva: That has prejudiced me against computers. I can't, I just can't. There is nothing in a computer that I want to know about, not the information, not Internet, not any of that, it just doesn't... Nothing.

Though a reluctant adapter, Abe was not against technology. He spoke enthusiastically about technology in relation to his grandchildren. But he did not want to learn:

> Even if I don't get into it myself, I like to see the changes. I think it's great. You know, instead of following the way you were brought up and all this stuff, the same old rut.

Abe did not use bank technology; he was just learning to use a calculator. From Edgar's perspective technology represented an uncomfortable change:

> I'm satisfied to do things the way I've always done it. Take the bank. I have one of those bank cards; I've never used it once... If (the personal service) is gone and I

> lose that then obviously I have to give in to this computer business and start using my computer cards and all the rest of whatever they have.

Edgar talked about adapting but admitted he was not about to change until he had to, when the tellers were gone. He recognized that he was being affected by technology in unaccounted ways:

> Already computers are affecting our lives. We just have to accept it. I accept it. ...I am satisfied to do it the way they're going to do it.

Reluctant adapters spoke of the efficacy of technology and a lack of interest. For some learning will occur only when it can no longer be avoided, as Edgar said he will have "to give in". Support for reluctant learners would be ad hoc and contextually bound.

Summary

The first part of Chapter 6 was a highlight of Chapters 4 and 5 as they might relate to the concept of learning to learn, or what might be more appropriately thought of as relearning to learn. The second part of this chapter proposed a conceptualized typology of older adults learning technology. The typology attempted to illustrate factors related to an individual's engagement in learning and implications for educators.

The typology is premised upon the assumption that older adults have thought about technology and that they make conscious decisions to initiate learning or to avoid learning technology, or at least when they want to learn. Explorers have learned to overcome cohort, social, employment-related or historical impediments that may have affected others of similar background. Self-directed and broadly interested in technology, they were reflective of the impact technology had upon those who did not learn.

Visioners and proactive learners were interested in learning, but they may be expected to be more goal-directed and purposefully selective in their bids to learn than explorers. Experience and exposure might be the greatest difference in these types, as visioners may have a stronger sense of their learning abilities, resources and process of achieving their goals. Proactive learners may be the most vulnerable: they appear interested in learning but do not have a clear sense of themselves as learners. Neither would they have a clear direction of where and how to access resources. The desire to take initiative would be apparent but support may be critical to taking action. For those who are not interested but feel compelled to learn (reactive adapters and reluctant adapters) guiding them on how to learn and instilling confidence for initiative taking may be a task of educators.

The typology permitted a cursory view of the older adult and the learning relationship with technology, as such it requires greater exploration. A typology of this sort has a potential to assist educators and planners making assessments of appropriate instructional methods and delivery, depth and breadth of content; pace and timing of delivery, and grouping for ability and numbers. Developing this typology using examples in the data illustrates that, like other aspects of the aging population, to ascribe homogeneous attributes based solely upon age is folly (Peterson, 1983). Rather than viewing older adults as one large group, the typology suggests that greater attention be paid to individual uniqueness within a learning context. For example, the data suggested that prior exposure to technology will impact upon learning. Individuals will be uniquely affected by barriers, just as exposure: negative, positive or neutral from work, volunteer, first-hand or vicarious opportunities will impact uniquely. As well, learners may experience barriers to learning in the forms of self-doubt, lack of support, and an inability to conceptualize the process and outcome of learning.

Creating and administering a survey that identifies learner characteristics according to this typology may be useful for tailoring instructional practices and integrating current research on aging. A better understanding of learning styles of older adults, whether they are the same as in youth and whether strategies can be developed to assist in learning technology would be appropriate.

This chapter concludes with recommendations and ideas for future research.

Implications

The purpose of this research was to better understand, by exploration of perceptions and experiences, older adults' initiative-taking and responses to learning computer technology, and the implications to their future attempts at learning. As exploratory research, the data identify barriers to learning that require more in-depth research, e.g., communication problems due to technology's lexicon, and learning relationships between grandchildren and grandparents. This study is foundational work for further research or as an aid to needs assessments delineating means, processes and responsibilities for assisting older learners.

The following are implications to older adult learning that emerged from the integration of data and external sources. The purpose is to bring the research off the shelf and give it life in the hands of educational practitioners, family members, learning and business institutions. They include:

Educators must continue efforts to dispel public myths and damaging stereotypes that older adults are technophobic; and that they cannot nor want to learn technology. Assumptions about those who do not want to learn should be considered in light of the barriers to learning that may affect their perceptions of technology.

Older adults recognize that they are, for the greatest extent, on the periphery of technology not having the education, work experience or support conducive to learning. This can effect their willingness to ask questions, complain, even to find adequate solutions to problems. Educators need to be involved in public awareness training.

Many older adults are interested in technology, its effects on society, themselves, their offspring. Some feel a loss of control and a demand to adapt, yet they appear to lack resources to make adequate assessments. Educators, service providers, family members need to develop a more proactive approach and a better understanding of how these feelings can affect one's self-concept.

The data suggested that adult children were looked to by their parents for information on technology, assistance purchasing technology and help learning. It was not always clear that parents asked for help, but a number of situations indicated that parents felt their adult children had the knowledge and ability to help them. It may be helpful for adult children to better understand both the positive and negative influence they have on their parents learning technology, and their potential role as an information resource.

Educators will want to develop and assess intergenerational learning programs between grandparents and grandchildren that creatively harness the enthusiasm and "natural" awareness of youth to computers with older adults' experiential knowledge.

Institutions which are becoming more reliant upon technology to provide services need to provide better learning opportunities for older adults. As applications become more abstract, i.e., banking by phone or computer, with less human interaction taking place, some older adults will need to develop confidence with the technology before adapting.

Institutions will want to be proactive in encouraging older adults to participate in learning. This may require developing on-going communication strategies, clear expression of the benefits in terms of impact upon maintenance of independence and self-sufficiency now and in the future. The data suggest that older adults need to understand the purpose of technology before they will invest the time and money to learn.

Businesses and institutions need to be more attentive to the learning needs of the older adult to whom they are marketing services and/or products. The data suggest that some older adults are uncomfortable purchasing technology because of the language barrier, and the need for initial and on-going technical support. Consumer education programs for older adults and employee sensitivity training may be appropriate.

There is a greater need for awareness training for sales and service staff to better understand aging. Such training would include dispelling stereotypes; recognition of the cognitive and physiological changes that occur with aging and which impact upon learning; anxiety of technology, and identification of unique training opportunities for older learners.

Educational institutions will need to look for methods of course delivery that have flexible delivery schedules. This may require re-evaluating structured course times and designing more opportunities for personal instruction. The data suggested that the ability to control personal time was important to many participants.

Those instructing older adults on computers require a grounding knowledge in the aging process with an understanding of its impact upon older adults as learners.

Those working with older adults as educators, trainers or tutors need to be conscious of the nuance of technical language and its ability to isolate. The data suggested that technical lexicon was not contextually bound in older adults' lives and there were few opportunities to learn. Use of teaching aids and strategies such as mnemonics, cheat sheets, mental maps and analogies may be helpful. Older adults who speak English as a second language can be expected to be uniquely disadvantaged by technology, as technical language, oral, written and symbolic, may not be well understood.

Educators may need to encourage older adults to add to their repertoire of learning skills a willingness to learn to relearn. Consequently instructing how to use technology will involve, at least initially, how to think about the process of learning. Less emphasis will be put on memorization and more emphasis upon process, visual cues, and knowing where to find support.

Some older adults do not have a sense of where their learning begins. The data suggested that some participants did not readily understand the process of putting in data in one form to achieve an outcome, e.g., creating spreadsheets. There is a need for many small, progressive accomplishments with immediate, ample feedback to gain confidence.

Older adults may bring to learning situations their understanding of "the basics" from their formal education that relied upon memorization and structure. Program development should include a "basics" of technical language, procedures and actions which older adult learners can master and use as a means of navigating within technology.

Older adults may bring a different value structure to learning technology in which there are feelings that technology places no credence upon their experiential knowledge. Educators need to be aware of and empathetic to the importance of this value shift as it impacts upon the individual's self-worth as a learner.

Older adults may not be able to see future benefits of technology in their lives because technology itself is a barrier, in its breadth and complex nature. Educators need to address by example and discussion that learning technology permits choice-making.

Educators may be instrumental in helping older adults learn that one does not have to understand technology to use it. The data suggested that this knowledge may be instrumental to feeling in control of one's learning. Without a sense of control, learners believe themselves to be the instruments of their learning misfortunes, not the poor technical designs, resources or instructions prone to technology.

Technological literacy amongst older adults may be most influenced by the informal camaraderie of older adults helping one another. Informal or organized through clubs or associations support networks appear to be sources of encouragement and technical skills. Formal learning networks or buddy systems would be inexpensive and easily developed.

Future Research

The following ideas for future research were generated during the data analysis and writing stage. The importance of such studies rests with the belief that a better understanding of older adults, technology and learning is intrinsically important and integral now. This concluding section proposes ideas for future research and some methodological considerations using focus groups with older participants.

Research Ideas

Research focusing upon understanding the theoretical and practical implications of older adults learning how to learn technology, or possibly relearning to learn technology, would assist in instruction and understanding of older adults as learners.

As computer programs for older adults expand, evaluative research is needed to assess whether programs are meeting the short and long-term needs of learners, as in teaching transferable learning skills and applying program knowledge to other situations.

Longitudinal studies following older adults attitudes, perceptions and experiences, as well as on-going use and development of computer skills is needed.

Because focus groups appear to have value as a methodology for data collection with older adults, detailed research is needed to expand upon some pertinent but insufficiently understood issues such as the impact of the age of the researcher/moderator, moderator and older adult interaction and rapport building, and moderator bias.

Methodology

The following is a brief discussion of some issues in the use of focus groups as a method of data collection with older adult populations. This methodology needs to be closely studied and critiqued for technique and value. Though the methodology can be useful and productive it has limitations. Very little research has been recorded on the use of focus groups with older adults (Quine & Cameron,1995).

The interaction and sharing common to focus groups, as discussed in Chapter 3, was expected to generate discussion on experiences that participants may have forgotten, or thought of as too embarrassing or not pertinent for discussion. As well, it was believed that the process of sharing experiences would give individuals an opportunity to see they were not struggling with technology in isolation. It was felt that participants could gain from the opportunity of hearing other people's concerns, tribulations and successes, while building upon the data gathering. It is difficult to know if this effect was achieved.

Focus groups appear to be a useful way of drawing out ambiguity or inconsistency without causing participants to be defensive or so critically circumspect of their feelings that they do not risk sharing. This situation became apparent with some older adults whose feelings about technology wavered, sometimes speaking negatively about it and then recounting stories about its convenience or fun. Rather than challenging participant inconsistencies and risk alienation, an attempt was made to have them expand upon the thoughts, recognizing this situation is not unusual to the focus group process.

It may have been the result of any number of issues in recruiting; however, there was a suggestion that the term "focus group" was not well understood which affected the recruiting process. When it became apparent that potential participants did not understand the focus group process, the term was changed to discussion group. It was the researcher's perception that older adults thought focus groups had connotations of them being the centre of focus. The term discussion group required less explanation, allowing potential participants to concentrate upon the research question rather than the process.

Researchers need to examine personal expectations of technique and outcomes prior to conducting focus groups with older adults. For example, the moderator may find more time is needed to find and develop nuggets from a meandering flow of discussion. The nuggets may only become apparent during analysis after several groups, consequently the temptation to limit discussion may be damaging to rapport-building and to data-gathering. Focus groups are a constant balancing between the researcher's purpose and what the participants believe important. If the moderator/researcher too quickly reins in discussion, s/he risks losing the good will of the volunteer participants. As well, discussions need time to unfold and stories to be told; and by acting too hastily a moderator risks missing the unique perspective and delivery of the older adult.

Though this may be more related to research topic than to the medium of data collection participants at times deferred to the focus group moderator for comment. This may be due to the perception that the facilitator had special content knowledge because s/he was the researcher or because of educational attainment. Also, it may be due to the research topic, as older adults appeared to perceive younger people to be technologically literate. This may impede older adults from sharing their concerns and anxieties or result in inadequate understanding for fear of sounding stupid or being thought foolish.

Further, the researcher/moderator needs to be intently reflective of the personal bias and values s/he brings to the data-gathering process with older adults. This means questioning how generational, cohort, educational, social, cultural differences can and will affect the line of questioning, process, and analysis. As well, participants have their biases and values of younger generations that will impact upon sharing.

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Appendix A: Consent Form

I, ____, agree to participate in a study of adults' experiences with, and perceptions of, computer technology conducted by Isobel Lawson for her Masters of Education, under the supervision of Dr. Dave Collett of the University of Alberta.

I understand I have the option to withdraw from participating in this study at any time.

I understand that my name will not be disclosed and names of places will be changed to ensure my anonymity.

I understand that all audio tapes of my responses will be erased after the study is completed.

I understand I am free to ask questions about the project.

____

Participant Signature

____

Date

Appendix B: Participant Profile Questionnaire

Date: ____________________

Focus Group Participant Profile

Please take a moment to complete.

First name: ____________________

1) Age: ____________________

2) Gender: Male Female

3) Education (highest level of completion):

High School College University

4) Previous Occupation(s): ______________________________________

5) Would you describe yourself as physically healthy?

For the most part Yes. For the most part No.

6) Have you ever used a computer? Yes No

7) Are you interested in learning to use a computer? Yes No

Comments?____

____

Thank-you for helping with my studies.

Isobel Lawson

Appendix C: Poster

YOU AND TECHNOLOGY:

HOW WELL DO YOU GET ALONG?

Have you had experiences (successful or unsuccessful) learning to use computer technology, say for instance, automated teller machines, computers, word processors, telebanking services, library terminals?

Were you confused, frustrated, fearful, angry? What made learning difficult? How did you learn to use it? Did you learn? How did you feel?

I am very interested in learning from your experiences. If you are approximately 65 years or older and have tried or are learning to use computer technology, you are invited to share your experiences in a focus group, in late January or early February.

Very little research has been conducted on the experiences of adults learning to use technology. Your experiences and insight are important.

Interested in participating? Do you need more information? Please call me, Isobel Lawson. Or leave your name and phone number with ____________________ in your administration office.

Call: Isobel Lawson, graduate student
Faculty of Education, University of Alberta
438-1936 (home)
492-4913 (university)